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AN OUTLINE OF THE NECESSARY

LAWS OF THOUGHT;

A TREATISE ON PURE AND APPLIED LOGIC.

BY WILLIAM THOMSON, M. A.

FELLOW AND TUTOR OF QUEEN'S COLLEGE OXFORD.

SECOND EDITION MUCH ENLARGED.

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Καλὴ μὲν οὖν καὶ θεία, εὖ ἴσθι, ἡ ὁρμὴ, ἣν ὁρμᾷς ἐπὶ τοὺς λόγους· ἕλκυσον δὲ σαυτὸν καὶ γύμνασαι μᾶλλον διὰ τῆς δοκούσης ἀχρήστου εἶναι καὶ καλουμένης ὑπὸ τῶν πολλῶν ἀδολεσχίας, ἕως ἔτι νέος εἶ· εἰ δὲ μὴ, σὲ διαφεύξεται ἡ ἀλήθεια.

PLATO.

1852
4-33
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TO

SIR WILLIAM HAMILTON, BART.

PROFESSOR OF LOGIC AND METAPHYSICS IN THE

UNIVERSITY OF EDINBURGH,

ETC. ETC.

THIS ESSAY

IS BY HIS PERMISSION INSCRIBED.

PREFACE.

SOME account of the exact poſition which this work pretends to occupy amidſt a crowd of valuable treatiſes on the ſame ſubject, may not be an unfitting introduction to its pages. The ſyſtem of Pure Logic or Analytic that has been univerſally accepted for centuries paſt, is very defective as an inſtrument for the analyſis of natural reaſoning. Arguments that commend themſelves to any untaught mind as valid and practically important, have no place in a ſyſtem that profeſſedly includes all reaſoning whatever: and an attempt to reduce to its technical forms the firſt few pages of any ſcientific work, has generally ended in failure and diſguſt. The conſequence has been that the more popular writers on Logic have begun to treat its ſtrictly technical parts with a certain coyneſs and reſerve. They have denied to the rules of the ſyllogiſm that prominent place once aſſigned to them, yet at the ſame time they have refrained from rejecting as cumbrous and unneceſſary an inſtrument which did not ſubſerve any practical end in their ſyſtems.

The preſent work is an attempt to enlarge the ſcience of Pure Logic, ſo that it may be adequate to the analyſis of any act of reaſoning. How far it has attained its object ought to be decided by the application of its principles to many miſcellaneous examples from different ſciences; and whilſt I have rigorouſly and frequently applied this teſt to it for eight years, I cannot hope that the partiality of an author will be a ſufficient guarantee of its pretenſions, and therefore commend the ſame line of examination to any one who believes, with me, that a ſedulous practice of logical analyſis will richly reward the underſtanding with acceſſions of ſtrength and clearſightedneſs. If the reſult ſhould be the detection of many errors and omiſſions on the author's part, enough of matter may perhaps be left unſhaken, to prove that Pure Logic is not the mere *officina veteramentaria*—the warehouſe of uſeleſs relics—it is too often taken for, but a practical ſyſtem—an important branch of mental culture.

In this edition, beſides many other alterations, very valuable help has been derived from the communications of Sir William Hamilton, of Edinburgh, of whoſe aſſiſtance, ſo fully and freely afforded, yet greater uſe would have been made, but for the hope that the valuable matter placed at my diſpoſal will ſoon be acceſſible to the ſtudent as part of his forthcoming work. In the publication of his *New Analytic*, logicians will have to recognize the commencement of a new era for their ſcience. Specific obligations to this great authority have been from time to time acknowledged in the following pages; but they are far from repreſenting the extent of aſſiſtance received.

But the doctrine of the ſyllogiſm here explained is ſubſtantially the ſame as that of the former edition; and it may perhaps be permitted me, without being ſuſpected of courting a compariſon between this little eſſay and a far ſuperior work, to point out that the twelve affirmative modes in each figure which replace the much more limited number of the old ſyſtem, are preciſely thoſe which Sir William Hamilton has found it neceſſary, on his own principles, to employ in his New Analytic. This will be an evidence to the reader that the alteration in queſtion is not raſh and arbitrary.

To Profeſſor De Morgan, the author of a very ingenious work undertaken with a ſimilar object, under the title of *A Treatiſe on Formal Logic*, my beſt acknowledgments are due for his kind and patient explanations of certain parts of his ſyſtem.

In Dr. Whewell's two works on the Inductive Sciences, Sir J. F. W. Herſchel's *Preliminary Diſcourſe on Natural Philoſophy*, and Mr. J. S. Mill's *Logic*, abundant materials will be found for the application of the rules of Pure Logic. In directing the reader to thoſe works, I muſt add that a collection of *Logical Examples* fairly drawn from different ſciences, and arranged in an aſcending ſcale of difficulty, is ſtill much needed, for the uſe of thoſe who have not time to purſue the ſubject through ſeveral extenſive and elaborate works.

W. T.

QUEEN'S COLLEGE,
OXFORD. Feb. 12, 1849.

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OUTLINE OF THE LAWS OF THOUGHT.

INTRODUCTION.

῎Ειπωμεν οὖν διὰ βραχέων τίς ἡ πρόθεσις καὶ τίς ὁ σκοπὸς πάσης τῆς ἀναλυτικῆς ἐπιστήμης.

Alexander Aphrod.

OUTLINE OF THE LAWS OF THOUGHT.

INTRODUCTION.

EVERY proceſs has laws, known or unknown, according to which it muſt take place. A conſciouſneſs of them is ſo far from being neceſſary to the proceſs, that we cannot diſcover what they are, except by analyſing the reſults it has left us. Poems muſt have been written before Horace could compoſe an "Art of Poetry," which required the analyſis and judicious criticiſm of works already in exiſtence. Men poured out burning ſpeeches and kindled their own emotions in the hearer's breaſt, before an Art of Rhetoric could be conſtructed.

They tilled the ground, croſſed the river or the ſea, healed their ſickneſſes with medicinal plants, before agriculture, chemiſtry, navigation, and medicine, had become ſciences. And wherever our knowledge of the laws of any proceſs has become more complete and accurate; as in aſtronomy, by the ſubſtitution of the Copernican for the Ptolemaic ſyſtem; in hiſtory, by a wiſer eſtimate than our fathers had the means of forming, of modern civilization and its tendencies; in chemiſtry, by ſuch diſcoveries as the atomic theory and the wonders of electro-magnetiſm; our progreſs has been made, not by mere poring in the cloſet over the rules already known, to reviſe and correct them by their own light, but by coming back again and again to the proceſs as it went on in nature, to apply our rules to facts, and ſee how far they contradicted or fell ſhort of explaining them. Aſtronomers turned to the ſtars, where the laws they ſought for were day and night fulfilling themſelves before their eyes; hiſtorians collected facts from the records of different countries, watched men of many races, of various climates, differently helped or hindered, for there, they knew, the true principles of hiſtory were to be read; and chemiſts, in the laboratory, untwiſted the very fibres of matter, and watched its every pulſe and change, to come at the laws which underlaid them. "Even geometry," ſays the great chemiſt, Juſtus Liebig, "had its foundation laid in experiments and obſervations; moſt of its theorems had been ſeen in practical examples, before the ſcience was eſtabliſhed by abſtract reaſoning. Thus, that the ſquare of the hypothenuſe of a right-angled triangle is equal to the ſum of the ſquares of the other two ſides, was an experimental diſcovery, or why did the diſcoverer ſacrifice a hecatomb when he made out its proof?"*

The ſame applies to Logic, or *the ſcience of the laws of thought*. The proceſs of thought commenced long before the rules to which it adheres with unfailing ſtrictneſs, had been drawn out. And though they do not *depend* on experience—*i. e.* their truth may be tried and made manifeſt without recurring to examples—ſtill without experience, without the power of watching our own thoughts and thoſe of others, there could never have been a ſcience of Logic, which had its origin when ſome reflective mind, that had for years performed the various acts of thought ſpontaneouſly, began to lay down the laws on which they take place, or to give rules for repeating them at pleaſure. The cleareſt reaſoner cannot with propriety be called a logician, ſo long as he diſputes ſpontaneouſly and without rule; whilſt the man of the humbleſt reaſoning powers may lay claim to the title, in ſo far as he reaſons according to laws, aſcertained by reflection upon the proceſs of thinking.* If we call Zeno of Elea the inventor of Dialectic or Logic in Greece,† it is not in virtue of his marvellous ingenuity in arguing againſt the poſſibility of motion, becauſe this might have been the reſult of natural acuteneſs; but becauſe his arguments, all conſtructed upon one type, that of forcing his antagoniſts into an abſurd poſition, by reaſonings drawn from their own views, ſeem to indicate the poſſeſſion of a logical rule, the ſame which now

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* Chemical Letters, Second Series, p. 6.

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* See *Couſin*, Nouveaux Fragments, p. 1, ſeq.

† It is uncertain whether the Hindu work of Gotama, called *Nyaya*, is anterior to the Greek logical ſyſtem. An account of it is given in *Colebrooke's Eſſays*, vol. ii. In another place I hope to be able to compare it with

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the logic of Greece, to which it bears a ſtrong reſemblance. Here a ſhort account of the logical argument, as deſcribed in it, may be inſerted. "A regular argument or complete ſyllogiſm (*Nyaya*) conſiſts of five members or component parts; 1ſt, the propoſition; 2nd, the reaſon, 3rd, the inſtance; 4th, the application; 5th, the concluſion. Ex.

1. This hill is fiery,
2. For it ſmokes.
3. What ſmokes is fiery; as a culinary hearth.
4. Accordingly, the hill is ſmoking;
5. Therefore it is fiery.

Some [commentators] confine the ſyllogiſm (*Nyaya*) to three members, either the three firſt, or the three laſt. In this latter form it is quite regular. The recital joined with the inſtance is the major; the application is the minor; the concluſion follows." *Colebrooke*, vol. ii. p. 292. Alſo *Couſin, Hiſtoire*, Leçon VI. and *St. Hilaire, Logique d'Ariſtote*, ii. 330.

has the name of *reductio ad abſurdum.* He had reflected upon thoſe modes of argument which his poſition led him to adopt ſpontaneouſly, and had formed a general rule or plan which aſſiſted him in forming like arguments in future. Logic then, like Philoſophy, of which it is a part, ariſes from the reflection of the mind upon its own proceſſes; a logician is not one who thinks, but one who can declare how he thinks. This important diſtinction, which has been too often neglected, muſt govern all reſearches into the hiſtory of the ſcience.

§ 2. Logic has been defined to be *the ſcience of the neceſſary laws of thought.* But this definition, the correctneſs of which ſhall preſently be examined more particularly, requires a few words of general explanation. Our thoughts are formed indeed by laws; and when we conceive, abſtract, define, judge, and deduce, we put in practice ſo many aſcertainable principles. But does Logic ſimply explain theſe laws *in themſelves*, or contemplate them *in their uſes*, as aſſiſting and regulating our efforts in ſearching after knowledge? This diſtinction is analogous to that which is drawn between Anatomy and Phyſiology, the former of which ſimply examines what are the parts of the human frame, and the latter, the Science of Life, dwells upon the uſes and developments of the parts: the one declares that I have a brain, and the other determines that it is the principal ſeat of paſſion, ſenſation, and reaſon; and that it is weak in childhood, ſtrong and conſtant in mature life, and ſubject to a gradual decay in age. It is competent to us unqueſtionably to conſider the principles of thought under this twofold aſpect of their nature and their employment. Thus, if we take a judgment; ſay, "The happineſs of the human family will increaſe in proportion to the increaſe of mutual love," and conſider it in its own nature, we ſhall decide that it is a judgment correct in form, that certain other judgments may be gathered from it, that it has ſome qualities which may belong to a judgment, and wants others; and ſo far we are only looking at the judgment *in itſelf*, by what we know of the laws of judgment. But if we conſider this example in connection with truth and knowledge, we are led to examine further, whether it is falſe or true, whether in forming it we fulfilled thoſe conditions, of obſervation and reaſoning, without which we have no right to expect a true reſult, to what region of thought it belongs, and what is the method, be it teſtimony, deduction from principles, or obſervation of facts, by which judgments are to be obtained in that region? In the former caſe we only put in requiſition what may be called *pure* Logic, which is defined to be *the ſcience of the neceſſary laws of thought in their own nature;* whilſt the queſtions in the latter caſe belong to *applied* Logic, or *the ſcience of the neceſſary laws of thought as employed in attaining truth.* It remains to aſcertain, whether the diſtinction is worth preſerving in our expoſition of the ſcience. Many logicians, believing that they muſt undertake to teach men "the art of reaſoning," do not attach any value to the laws of thinking, except in ſo far as the employment of them may help men to think, and ſo to enlarge their ſtock of truth; that is, they do not regard pure Logic as a diſtinct branch of their ſubject. But there is one grand reaſon for the oppoſite courſe. Truth is a wide word, and denotes all that we can ever know of ourſelves, the univerſe, and the Creator. The ſcience which explains how the mind deals with truth, muſt be looſe and indefinite, as its object matter is of infinite extent; ſo that applied Logic can never attain perfect completeneſs and preciſion, becauſe it can never affirm that it has ſhown how the mind deals with every part of truth and knowledge. But the laws of thought themſelves are few in number, and lie, in examples of perpetual occurrence, under every thinking man's obſervation; and therefore it may be declared with tolerable correctneſs when a full and accurate view of pure Logic has been taken. To ſecure that which we have completely maſtered, it is deſirable to keep it ſeparate from that in which perfect completeneſs is hopeleſs; and therefore we purpoſe to conſider Logic under two diſtinct lights, firſt as a ſcience of laws, and next as a ſcience of laws applied to practice. But here a caution is neceſſary (which we ſhall have to repeat in connection with the tripartite diviſion of pure Logic itſelf) that as the diſtinction is in a meaſure arbitrary, for the laws of thought are always put in force with a view to the attainment or communication of knowledge, it will be impoſſible to maintain it with perfect conſiſtency throughout our labours. Occaſions conſtantly ariſe when the line of demarcation becomes blurred and confuſed; when the bare laws of thought cannot be explained without the mention of that truth, in the ſearch for which they are always employed: thus, in treating of Definition, which is one form of judgment, we imply the exiſtence of a perſon *for* whom it is neceſſary to define a given notion that he may poſſeſs the true meaning of it, and be able to identify the things for which it ſtands. All that can be expected from us is, that, even if we find it neceſſary to repeat the ſame truths in the two diviſions, we do not deſert our point of view, but explain the laws of thought, firſt, mainly for themſelves, and then mainly in relation to truth, which is the object of all thought and enquiry.

Pure Logic (which is later in the order of diſcovery than applied, inaſmuch as it is formed by abſtracting from that more general ſcience,) takes no account of the modes in which we collect the *materials* of thought, ſuch as, Perception, Belief, Memory, Suggeſtion, Aſſociation of Ideas; although theſe are all in one ſenſe laws of thought.* Preſuppoſing the poſſeſſion of the materials, it only refers them to their proper head or principle, as conceptions, as ſubjects or predicates, as judgments, or as arguments. It enounces the laws we muſt obſerve in thinking, but does not explain the ſubſidiary proceſſes, ſome or all of which muſt take place to allow us to think. Metaphyſics is the ſcience in which theſe find place; but they alſo belong to *applied* Logic, becauſe they are ſo many conditions under which the human mind acquires knowledge. Again, in pure Logic, the different proceſſes of the mind are regarded in their perfect and complete ſtate; whilſt in applied, the imperfect faculties of man, the limited opportunities of obſervation, the neceſſity of deciding upon a queſtion when the materials of a judgment are ſtill inſufficient, impoſe many limitations on the perfection of our knowledge. Thus, whilſt pure Logic only treats of arguments that are certain and irrefutable, applied Logic is compelled to admit, and to gauge the value of, ſuch an argument as this—" All men ſeek revenge, and therefore Theophilus will avenge himſelf," where the premiſs, not being true of all men without exception,* will taint the concluſion with its own uncertainty. Indeed, the moſt important duty of applied Logic is to determine under what conditions imperfect arguments, ſuch as the Example, the Imperfect Induction, the Deduction from a propoſition that is not truly univerſal, and ſome of the Rhetorical Enthymenes can be fairly employed, and to ſhow, that though theſe weaker forms are ſo many deviations from a perfect demonſtrative argument, they are ſo far from ſuperſeding the perfect forms, that in reality each of them appeals to, and atteſts the cogency of, ſome perfect form, to which it ſtrives, as it were, to conform itſelf. As we are anticipating, a very eaſy example muſt ſuffice to illuſtrate our meaning. Every one is perfectly certain of the truth of the propoſition that *men grow infirm and die;* of which we have been convinced partly by our own experience of men, and partly by the experience of others, delivered to us from all quarters, in the ſober pages of the moraliſt as well as in the reckleſs lyrics of the reveller. Nor does our conviction of this truth permit itſelf to be diſturbed by the conſideration, which is likewiſe undeniable, that the whole aggregate of this experience does not in itſelf warrant any ſtatement having *all* mankind for its ſubject: that even ſuppoſing the decadence and death of every man in times paſt had been obſerved, which is utterly inconceivable, at any rate there are many now living upon whom the common doom has not paſſed, and whoſe caſes therefore cannot enter into the ſum of our experience. In a word, we have concluded from an experience that *many* men have become infirm and died, the much wider truth that *all* men do ſo; and this is warrantable in the given caſe, and we are right in rejecting upon the faith of it an aſſertion, unleſs ſupported by evidence that tranſcends experience, that one man has not died, ſuch as we have in the fable of the Wandering Jew, or a propoſal to obviate death in future, ſuch as was involved in the ſearch of the alchemiſt for an Elixir of Life. But that this mode of argument from a particular to a univerſal, from *ſome* to *all* is not valid in itſelf, is evident from applying it to another caſe, in which it is abſurdly falſe; *ſome men are tall, therefore all men are tall:* and the only form perfectly indiſputable in itſelf would be, "the men whom we have obſerved have all died, and theſe men are all men, that is, the only men, therefore all men die," which from the nature of this caſe cannot be employed. But applied Logic firſt ſhows that this perfect argument is the meaſure of the validity of the other; that our concluſion is only true if we can ſay, not indeed "theſe men are all men," which is impoſſible, but the equally *general* propoſition "Theſe men are (*as good as*) all men;" thus, conforming really to the perfectly concluſive argument; and next, how and under what circumſtances we can conform the incomplete to the complete enumeration, how *ſome* can ever be ſaid to be as good as *all* for purpoſes of argumentation.

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* "Now univerſal Logic is either pure or applied Logic. In the firſt we make abſtraction of all empirical conditions, under which our underſtanding is exerciſed; for example, of the influence of the ſenſes—the play of the imagination—the laws of memory—the power of habit, of inclination, &c.; conſequently alſo of the ſources of prejudices, nay, in fact, in general, of all cauſes out of which certain cognitions ariſe to us or are pretended to do ſo, ſince they merely concern the underſtanding under certain circumſtances of its application, and in order to know them, experience is requiſite."—*Kant's Critique*, p. 58, Engliſh Tranſl. The ground here taken is different from that in the text. I do not ſay they are *contingent*, for memory, for example, enters into every act of thought; but, that they are *ſubſidiary*; thought is not complete without them, but at the ſame time thought is never complete with them alone.

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* It is the εἰκὸς of Ariſtotle.

But it is time to proceed to examine the different parts of the definition of pure Logic, by ſhewing that Logic is a ſcience, rather than an art—that it is a ſcience of the neceſſary laws or forms of thought—that it has thought rather than language for its adequate object-matter.

§ 3. *Logic is a ſcience, rather than an art.* The diſtinction between ſcience and art is, that a ſcience is a body of principles and deductions, to explain the nature of ſome object-matter: an art is a body of precepts, with practical ſkill, for the completion of ſome work. A ſcience teaches us to know, and an art to do; the former declares that ſomething exiſts, with the laws and cauſes which belong to its exiſtence, the latter teaches how ſomething muſt be produced.* An art will of courſe admit into its limits every thing which can conduce to the performance of its proper work; it can recognize no other principle of ſelection. The painter may fail of perfect ſucceſs from employing improper colouring materials, or a muddy and periſhable varniſh, as well as from incorrect drawing or ill-managed light and ſhade; the lower defect and the higher are fatal to that perfect picture which he wiſhes to produce. So that an art may contain precepts of a very diſſimilar character; the painter muſt be taught Expreſſion, Anatomy, and mixing of Colours; the Rhetorician muſt learn to manage his thoughts, his hearers, and his hands, with equal dexterity. The ſcience, on the other hand, having the object-matter for its touchſtone, admits nothing except what relates directly to it; and ſo a far greater unity and ſimplicity naturally belongs to it. Geometry treats of no-

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* Περὶ γένεσιν τέχνη, περὶ τὸ ὂν ἐπιστήμη. *Ariſtotle. An. Poſt.* II. xix. 4. By ſcience in the text is meant the *ſpeculative* ſcience of *Plato* and *Ariſtotle*; by Art the *practical* ſcience. *Plato* ſeems to uſe τέχνη and ἐπιστήμη as interchangeable terms (*Theæt.* 146, C.). Again (*Politicus*, 258, D, E.) he divides ἐπιστῆμαι into

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πρακτικαὶ and γνωστικαὶ; the latter he would ſubdivide (260, B.) into *critical*, which end in judging merely, and *epitactical*, which lead us to ſome practical reſult. See alſo *Theæt.* 202, D. For *Ariſtotle's* view of Science, conſult, among other places, *An. Poſt.* 1, ii. Top. VI. viii. 1, *Eth. Nic.* VI. iii.

thing but the properties of ſpace, becauſe it is a pure ſcience, whilſt the arts founded upon it, ſuch as Land-ſurveying, muſt bring in ſuch topics as inequalities of ſurface, uſe of inſtruments, and the like. The ſcience of Muſical Counterpoint teaches the theory of harmonic progreſſions, and nothing elſe; but the muſician's *art*, in which it is employed, muſt add the knowledge of inſtruments and their compaſs, of the human voice, even ſometimes of the powers of a particular finger. Now in the popular meaning of the word Logic, no doubt the notion of an *art* is more prominent; to be able to reaſon better, and to expoſe errors in the reaſoning of others, is ſuppoſed to be the object of this ſtudy.* But thoſe writers who have followed out this view have been compelled to go over too wide a field for any one ſyſtem. Logic muſt be the wideſt of all arts or ſciences; becauſe thinking, which is its object-matter, belongs to all the reſt; it is *ars artium*, the art which comprehends all others, becauſe its rules apply to every ſubject on which the human mind can be engaged. If then it is to be taught as an Art, it ſhould contain ſpecific rules for reaſoning or thinking in every region of thought; it muſt propoſe to itſelf nothing leſs than to enable men of the moſt various capacities to apply a ſet of principles to effect the work of thinking correctly, under all circumſtances. And the conſequences are, an enormous expanſion in the firſt inſtance, from the huge maſs of heterogeneous materials; and a conſciouſneſs of incompleteneſs in the ſecond, ſince it is impoſſible to ſuppoſe that ſo vaſt a work has ever been completely achieved. Works in which the attempt has been made, often contain a chapter on Scriptural Interpretation, and perhaps another on Forming a Judgment on Books:—can it be ſuppoſed that the precepts under either of theſe heads can be complete? The one is an epitome of all Theology, and the other, it might be ſaid, of all wiſdom. Now Logic may be unqueſtionably an Art or a Science; but it ſeems that all we can do is to lay down the principles of the ſcience and leave each ſtudent to form for himſelf his own art, to teach himſelf how to employ theſe principles in practice. In this way we may attain ſomething like completeneſs in a moderate compaſs, and may eſcape thoſe inceſſant ſhiftings of the boundaries of the art, which are inevitable where men have to ſelect a finite number of precepts out of infinite knowledge.

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* Upon the hiſtorical queſtion, whether Logic is an Art or a Science, moſt valuable remarks will be found in a paper by *Sir William Hamilton. Edinburgh Review*, 115, p. 202, ſeq.

Thoſe who repreſent Logic as both art and ſcience are accuſtomed to aſſume that all arts, poſſeſſing the principles of correſpondent ſciences, teach their application to practice, ſo that art is but ſcience turned to account. In the caſe of Logic this is not very far from the truth; but as a general ſtatement it is falſe, for it overlooks that notion of *unconſciouſneſs* which is commonly involved in Art. Shakeſpeare is admitted to be a conſummate artiſt, but no one means by this that his plays were compoſed only to develope a certain expreſs theory of Dramatic Poetry, ſuch as Coleridge, Horn, or Ulrici have ſince founded upon them. No: the man of ſcience poſſeſſes principles, but the artiſt, not the leſs nobly gifted on that account, is poſſeſſed and carried away by them. "The principles which Art *involves*, ſcience alone *evolves*. The truths on which the ſucceſs of Art depends, lurk in the artiſt's mind in an undeveloped ſtate; guiding his hand, ſtimulating his invention, balancing his judgment, but not appearing in the form of enunciated propoſitions."[*] And becauſe the artiſt cannot always communicate his own principles, men ſpeak of his "*happy* art," as if it were almoſt by chance or *hap* that his works were accompliſhed;[†] and it was the faſhion of the laſt century to ſpeak of Shakeſpeare himſelf as a wild, untutored child of genius, not even to be named as an artiſt, becauſe in truth his plays wanted dramatic *ſcience* and were not obedient to the law of the dramatic unities. So that the praiſe of being a good logician, or of having a logical mind, is ſometimes awarded where there is little or no acquaintance with the ſcience of logic. An underſtanding naturally clear, and a certain power of imitation, will enable the thinker or ſpeaker to pour forth arguments which might ſerve for examples of all the logical rules, not one of which he has learnt; and without ſome ſhare of theſe talents, no precepts would avail to make a reaſoner. But when we write upon Logic, the unconſciouſneſs of the artiſt muſt be left out of the account, becauſe it cannot be communicated by rules. By the art of Logic we mean ſo much of the art of thinking as is teachable, and no more. The whole of every *ſcience* can be made the ſubject of teaching.*

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[*] *Whewell's* Philoſophy of Ind. Sciences, II. p. 111.

[†] So we have the line of *Agatho*, Τέχνη τύχην ἔστερξε, καὶ τύχη τέχνην.

In treating of Logic as a ſcience, we ſhall not forget that the ultimate object of the ſtudy is ſtrictly practical, and ſhall labour to ſtate the principles in ſuch a way as to facilitate to the ſtudent their application as an art. If we would redeem Logic from the charge uſually brought againſt it, that it is a ſyſtem of rules which the initiated never employ, and the uninitiated never miſs, it muſt be by giving it a far more extenſive verification in practice than it uſually receives. The inconſiſtency of teaching a ſcience, where we mean that an art ſhould be ultimately learnt, is only apparent, not real; and at any rate is leſs injurious than that of thoſe who teach an "inſtrumental art" which is never reduced to practice, and of which the very attempt would at once demonſtrate the inſufficiency.

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* Διδακτὴ πᾶσα ἐπιστήμη δοκεῖ εἶναι. *Ariſtotle's Eth. Nic.* VI. iii.

§ 4. *Pure Logic is a ſcience of the neceſſary laws of thought.* After the remarks already made,* this ſubject will need leſs illuſtration. Logic only gives us thoſe principles which conſtitute thought; and preſuppoſes the operation of thoſe principles by which we gain the materials for thinking. Thus I have a conception of *houſe* which ſums up and compriſes all buildings in which men live; how did I obtain it? Logic anſwers that it was generalized from different ſingle houſes which I had ſeen, by noticing what points they had in common, and by gathering up theſe common features into a new notion. It tells us further that this conception has various powers, that it may be defined, by declaring what I underſtand by it, that it may be divided, as into "houſes of the rich" and "houſes of the poor," that by comparing it with other general notions, as church, quay, monumental pillar, I may form a more general conception, in which all theſe may be comprehended, that of building. In all this Logic is to a certain extent my guide, becauſe *conception* is one great function of thought; but with conſiderable reſervations. It only tells me what is true of *all* conceptions, and leaves me to apply the principles to this particular one; for about *houſes* Logic of courſe knows nothing, and to know what is a houſe and what not,

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* P. 11, ſeq.

I muſt go to Architecture or to common ſenſe. Logic only tells me what principles I *muſt* put in practice in forming any general notion whatever; but to her all general notions are alike. She makes no account of the great diverſity of the claſſes of things they repreſent; king, animal, acid, mammal are all alike to her, and ranked together as conceptions, though the ſets of objects they ſeverally ſtand for, have little reſemblance. Logic then takes no account of the *contents* of a conception, of the things from which it is generalized; theſe are contingent *to her*—if any given claſs from which a conception is now formed were annihilated, there would ſtill be conceptions. The function of conception is eſſential to thought; its laws are accordingly laid down, but their particular uſe muſt be determined by the particular ſciences. Logic teaches me what Generalization, or the forming of common notions from many things, is; but Botany teaches me to generalize upon plants, Political Economy upon the facts of ſocial proſperity, and Geometry upon the properties of ſpace.

In another direction alſo Logic ſeems to ſtop ſhort, and to leave to another ſcience what it was incumbent upon it to explain. Our conceptions are formed from ſingle objects; how do we come to know theſe? The logician replies, that it is not his buſineſs to ſhew how, but that for the moſt part they are derived from the ſenſes, by means of which we are put in communication with the external world. But many farther queſtions ariſe out of this anſwer. What are the ſenſes? How much of every notion conveyed by them is new, how much is the reſult of the experience of paſt impreſſions? Does my *ſight* tell me that yonder ſteeple is about three miles off, or is it my underſtanding co-operating with my ſight? Is there no doubt that the ſenſes report truly? Are we even certain that there *is* an external world? To theſe and many like queſtions the logician has one anſwer;—"I preſuppoſe a man able to perceive, to receive impreſſions from the ſurrounding world, and then merely explain the principles on which he *muſt* proceed, in combining his impreſſions and drawing inferences from them. The ſpeculations you ſuggeſt are highly intereſting, and all who would underſtand the mind of man muſt enter upon them; but the ſcience of Metaphyſics, or of the Human Mind has already taken them up, and, cloſely connected as Logic is with this ſcience, it is *expedient* that they ſhould divide the ground. Logic therefore preſuppoſes a mind capable of, and actually receiving, impreſſions; though, perhaps, if there were no ſuch ſcience as Metaphyſics, it would be neceſſary even in a logical work to give a preliminary account of the origin of all knowledge."

§ 5. *Pure Logic is a ſcience of the form, or the formal laws of thinking*, and not of the *matter*. Though we may doubt the policy of preſerving an expreſſion like *form*, the meaning of which, originating in a looſe and vague metaphor, is difficult to catch and retain, it is ſo generally uſed in connexion with Logic that ſome attempt to explain it ſeems demanded by our preſent purpoſe.

A ſtatue may be conſidered as conſiſting of two parts, the marble out of which it is hewn, which is its *matter* or *ſtuff*, and the *form* which the artiſt communicates. The latter is eſſential to the ſtatue, but not the former, ſince the work might be the ſame, though the material were different; but if the form were wanting we could not even call the work a ſtatue. This notion, of a *material* ſuſceptible of a certain *form*, the acceſſion of which ſhall give it a new nature and name, may be analogically transferred to other natures. Space may be regarded as *matter*, and geometrical figures as the *form* impreſſed in it. The voice is the *matter* of ſpeech, and articulation the *form*. But as it is the form which proximately and obviouſly makes the thing what it is (although there can be no form without matter), the word form came to be interchanged with *eſſence* and with *nature*. Already we have left the original ſenſe at ſome diſtance.

With thinkers to whom the metaphorical ſenſe was not ſo prominent, the word is uſed in three diſtinct but cognate ſenſes. It is, 1ſt, a law or an idea, which are the ſame thing ſeen from oppoſite points. "That which, contemplated *objectively* (that is, as exiſting externally to the mind) we call a law; the ſame contemplated *ſubjectively* (that is, as exiſting in a ſubject or mind) is an Idea. Hence Plato often names Ideas, Laws; and Lord Bacon, the Britiſh Plato, deſcribes the laws of the material univerſe as ideas in nature. *Quod in naturâ naturatâ lex, in naturâ naturante idea dicitur*."* Lava, heated metal, boiling water, the rays of the ſun, all rank under one common form (that is, law) of *heat*, namely: by which is meant that they, all and each, contain whatever is eſſential to heat. Lead, gold, vermilion, ſtones, and (in a greater or leſs degree) all bodies, poſſeſs weight; the law of weight then is their form—the law under which they all come, the condition with which they all comply. By virtue of this form they are, not bodies indeed, but *heavy* bodies: in other words, if we ſuppoſe that form or law to be expunged from the tables of the univerſe, their exiſtence as to that nature or property would terminate; or if the *idea* of weight were removed from the mind, we could no longer know them as heavy bodies.

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* *Coleridge's* Church and State, p. 12.

Now how does every one of the given inſtances come under the forms, heat and gravitation? By ſomething contained within itſelf—by its embodying the law or definition: that which comes under the form of *weight*, muſt poſſeſs weight, muſt have in it all that the definition of weight demands. And here we may trace the ſecond meaning of the word form: it is *that part of any object through which it ranks under a given law*. Every new object repreſented to the mind is referred to different laws, called forms, by virtue of various qualities in itſelf, each of which is termed metonymically, and with reſpect to the law under which it is the means of ranking the repreſentation, its form. When we obſerve (ſay) a ſtone, the mind proceeds to claſs the repreſentation of it, afforded by the ſenſes, under the various forms of *colour*, *figure*, *ſize*, *weight*, *temperature*, &c.; and with reference to the *form* (law) of weight, the weight of the object would be its form (eſſential part), with reference to the form of colour, the colour of the object would be its form. So that that, which in the object, when viewed in relation to one law or form, is its form (eſſential part), is not its form when it is viewed in relation to another. Now the *matter* of any repreſentation is that part of it which with reference to any given law is non-formal.* Thus in our ſtone, the weight, ſize, temperature are parts of the matter, as far as the law of colour is concerned, for they are all non-formal, and the colour of the ſtone alone is formal. The matter is that which, when added to the form (eſſential part), gives it extra-neity — *outneſs* — objective exiſtence. Without ſomething more than the mere form, there can be no *inſtance* of a law, an inſtance being the preſence of the law in an object capable of containing it, and thus preſuppoſing two things, the law and the capable object, whereof we term one the form and the other the matter. *Ex. gr. triangle* may be conceived by means of its own *form* or definition alone, but it muſt have a material part, it muſt become *a* triangle of ſtone, or wood, or ink on paper, as the condition of its external exiſtence. When no ſeparation, according to ſome law or other, of a repreſentation into its formal and material part takes place, that is, where it is referred to no law or conception already in the mind, there muſt be total ignorance of the object repreſented: the repreſentation muſt remain obſcure, and can never amount to a cognition. The abſolutely material part of a cognition would be that which remains unknown after it has been brought under as many forms as the mind can reduce it to; that which never becomes the condition of its ranking under a law. Forms have a triple mode of exiſtence; they exiſt in the Divine Mind as ideas, and are the archetypes of creation; they exiſt as embodied in "inſtances" or examples, in which mode they are laws; they exiſt laſtly in the human mind as ideas: thus they precede creation, they are in it, they ſucceed it.

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* Hence the ſame thing is alternately form and matter. See *Ritter's Hiſtory,* III. p. 121, (Eng. Tranſ.) for this point in Ariſtotle's doctrine.

Writers of this ſchool give yet a third ſenſe to the word form; as it denotes the law, ſo by an eaſy tranſition it ſtands for the claſs of caſes brought together and united by the law. Thus to ſpeak of the form of animal might mean, firſt, the law or definition of animal in general; ſecond, the part of any given animal by which it comes under the law, and is what it is; and laſt, the claſs of animals in general formed by the law.

The ſenſe attached at the preſent day to the words form and matter is ſomewhat different from, though cloſely related to theſe. The form is what the mind impreſſes upon its perceptions of objects, which are the matter; form therefore means *mode of viewing* objects that are preſented to the mind. When the attention is directed to any object, we do not ſee the object itſelf, but contemplate it in the light of our own prior conceptions. A rich man, for example, is regarded by the poor and ignorant under the form of a very fortunate perſon, able to purchaſe luxuries which are above their own reach; by the religious mind, under the form of a perſon with more than ordinary temptations to contend with; by the political economiſt, under that of an example of the unequal diſtribution of wealth; by the tradeſman, under that of one whoſe patronage is valuable. Now the object is really the ſame to all theſe obſervers; the ſame " rich man" has been repreſented under all theſe different forms. And the reaſon that the obſervers are able ſo to find many in one, is that they connect him ſeverally with their own prior conceptions. The form then in this view is mode of knowing; and the matter is the perception, or object we have to know.* Hence, when we call Lo-

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* A few paſſages to illuſtrate theſe various meanings, may be added here. *Plato* uſes form in all the three ſenſes, of law, diſtinctive or eſſential part, and ſpecies (which laſt word means *form*); as theſe places will ſhow.

" Remember then, that I directed you not to teach me ſome one or two holy acts out of many, but that gic a ſcience of the formal laws, or the form, of thinking, we mean that the ſcience is only concerned with that which is eſſential

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very form by which all holy acts are holy . . . . . . Teach me then, the nature of that form itſelf, that looking to it and uſing it for our example, I may declare any of the actions of yourſelf or any other, which partake of this nature, to be holy, and any not ſo partaking, not to be holy."—*Plat. Euthyp.* 6, D. E. "And of the juſt, the unjuſt, the good, the evil, of all the forms in ſhort, the ſame holds true, that each is one and ſimple, but becauſe every where appearing by incorporation with actions, or matter, or other things, that each appears many."—*Reſp.* 476, A. "For we have been accuſtomed to lay down one form for many particular caſes, on which we impoſe the ſame name."—*Reſp.* 596, A. "And according to the ſame form of juſtice, a juſt man will nowiſe differ from a juſt city, but will be like it."—*Reſp.* 435, B. See alſo *Symp.* 205, D.; *Reſp.* 581, E.; *Polit.* 258, E. Lord *Bacon* ſays, "The form of any nature is ſuch that where it has place the given nature is alſo, as an infallible conſequence. Therefore it is ever preſent where the given nature is ſo, it atteſts that nature's preſence, and is in it all. The ſame form is ſuch that upon its removal the given nature infallibly vaniſhes. Therefore it is invariably abſent where that nature is ſo, it in thoſe caſes diſavows that nature's preſence, and is in it alone."—*Nov. Org.* II. 4. "The examination of forms proceeds thus. Concern-to, and diſtinctive of, the thinking proceſs. Every act of thought, is a thought *about* ſomething; it has *matter* as well as *form*. Every common noun is a ſign of the act of conception; thus cryſtal is a conception formed from comparing together many inorganic bodies which have ſpontaneouſly aſſumed certain regular forms; animal, a conception from comparing many live crea-

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ing the given nature we muſt firſt bring together before the intellect all the known inſtances, agreeing in that nature, though manifeſting it in vehicles [*i. e.* in matter] the moſt diſſimilar."—*Nov. Org.* II. 11. Again, "When we ſpeak of forms, we underſtand nothing elſe than thoſe laws and manifeſtations of the pure act, which order and conſtitute any ſimple nature, as heat, light, weight, in any ſort of matter and ſubject that can contain them. Therefore, the form of heat or form of light, and the law of heat or light is the ſame thing, nor do we ever abſtract our thoughts from actualities and active manifeſtations."—*Nov. Org.* II. 17. Again, "For ſince the form of a thing is the very thing itſelf (*ipſiſſima res*), and the thing no otherwiſe differs from the form, than as the apparent differs from the exiſtent, the outward from the inward, or that which is conſidered in relation to man from that which is conſidered in relation to the univerſe [*or* univerſal mind], it follows clearly that no tures. Here the form is the ſame, for both are conceptions, and it is this quality which conſtitutes them thoughts; but the matter is different, for one is about certain inorganic ſolids, and the other about living creatures. Logic, not being concerned with the things that thoughts are formed from,* ranks the two together: it is for Mineralogy and Zoology to diſtinguiſh between them, Logic

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nature can be taken for the true form, unleſs it ever decreaſes when the nature itſelf decreaſes, and in like manner is always increaſed, when the nature is increaſed."—*Nov. Org.* II. 13.

Rutter in his Hiſtory ſhews the analogy between form and difference, matter and genus reſpectively, in the writings of *Ariſtotle; Plotinus* indeed aſſerts their abſolute identity.—*Ennead.* II. iv. 4. For a collection of paſſages to illuſtrate *Ariſtotle's* doctrine, ſee *Waitz*' *Organon.* comm. on 94. a. 20. To our own great writers the philoſophical ſenſes of the word *form* were well known. *Taylor, Andrewes, Hooker, Berkeley, Butler, Sir Thomas Brown, Coleridge*—ſupply inſtances which are now before us. But the ſubject has already occupied our attention long enough. *Keckermann's* Logic affords materials for underſtanding the views of the old logicians.

* See p. 24. *ſeq.*

only knows them for their formal or logical value. Are they conceptions? are they judgments, ſyllogiſms, definitions, or genera? Occupied only with the bare laws of thinking, Logic muſt leave to other ſciences the conſideration of the various matters upon which theſe laws operate. In theſe thoughts —"life is ſhort"—"Mirabeau was ſaid to have been poiſoned"—"the radii of a circle are equal," we have only one form or law of thinking, namely Judgment, exhibited in connexion with various things or matter.

The philoſophic value of the terms matter and form is greatly reduced by the confuſion which ſeems invariably to follow their extenſive uſe. Whilſt one writer explains form as "the mode of knowing" an object, another puts it for "diſtinctive part," which has to do with the being or nature of the thing rather than with our knowledge of it; where it means "ſhape" in one place, which is often a mere accident, in another it means "eſſence;" ſo that it may be brought to ſtand for nearly oppoſite things. I will add, that probably there is no idea which theſe terms repreſent that cannot be conveniently expreſſed by others, leſs open to confuſion.

§ 6. Logic is ſaid, in the language of the old writers, to be concerned only with ſecond notions or intentions. The diſtinction between firſt and ſecond intentions is connected with that which has been drawn between matter and form. Notions are of two kinds; they either have regard to *things as they are*, as horſe, ſhip, tree, and are called firſt notions; or to things as they are *underſtood*, as notions of genus, ſpecies, attribute, ſubject, and in this reſpect are called ſecond notions, which however are baſed upon the firſt, and cannot be conceived without them. Now Logic is not ſo much employed upon firſt notions of things, as upon ſecond; that is, as we have ſaid, it is not occupied ſo much with things as they exiſt in nature, but with the way in which the mind conceives them. A logician has nothing to do with aſcertaining whether a horſe or a ſhip, or a tree exiſts, but whether one of theſe things can be regarded as a genus or ſpecies, whether it can be called a ſubject or an attribute, whether from the conjunction of many ſecond notions a propoſition, a definition, or a ſyllogiſm can be formed. The firſt intention of every word is its real meaning; the ſecond intention, its logical value, according to the function of thought to which it belongs.*

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* See *Buhle* (*Ariſtotle* i. p. 432) whoſe words I have followed. See alſo *Crackanthorp*, (Logic. Proœm.) and *Sir W. Hamilton* (of Edinburgh) in the Edinburgh Review, No. 115, p. 210. There is no authority whatever for *Aldrich's* view, which makes ſecond intention mean apparently "a term defined for ſcientific uſe;" though with the tenacious vitality of error it ſtill lingers in ſome quarters, after wounds that ſhould have been mortal.

OUTLINE OF THE LAWS OF THOUGHT.

LANGUAGE.

" Nomina ſi neſcis, perit et cognitio rerum."

" Ἐστὶ μὲν οὖν τὰ ἐν τῇ φωνῇ τῶν ἐν τῇ ψύχῃ παθημάτων σύμϐολα."—*Ariſt. de Int.*

§ 7.

HITHERTO we have aſſumed that the adequate object matter of Logic is *thought*, rather than language; that having explained the laws of thinking, it is not bound to examine under what conditions theſe manifeſt themſelves in ſpeech. But logicians do not invariably follow this courſe; thoſe who regard it as an act of reaſoning, ſeeing that reaſoning is not conducted but by language, and that many of the chief impediments to the correct performance of the proceſs, lie in the defects of expreſſion, make ſpeech and not thought the matter with which they are primarily concerned. The name of Logic itſelf would not be inconſiſtent with this view; ſince *logos* may mean the outer or the inner word—the *ſermo internus* or the *ſermo externus*—the articulate expreſſion or the thought itſelf. Here then the relation between thought and language muſt be aſcertained.

Language is not only the vehicle of thought, but it is a great and efficient inſtrument in thinking. By obſerving the properties common to ſeveral things, we are able to divide them into groups or claſſes, and to ſpeak of and reaſon about the claſſes, inſtead of tedioufly recurring to each individual at every ſtage of our progreſs. Wanting this power we ſhould be utterly unable to cultivate ſcience in any the loweſt degree, becauſe ſcience is but the grouping of ſingle caſes under laws. Nay, we could not form one rule or maxim upon the ſubjects of common experience, for rules and maxims too are general, and founded upon many particular caſes. Let any one endeavour to think or ſpeak upon a ſubject without employing general terms, and he will not only find his powers crippled by being precluded from all truths of this kind, but alſo that he cannot even give his accuſtomed names to the ſingle objects which meet his ſenſes; ſince he has long been in the habit of making general ſerve inſtead of proper names, to ſave a needleſs multiplication of the latter. The ſtar which the aſtronomer knows as Sirius he calls "that ſtar;" the mountain which is Cader Idris in the map is "that mountain;" thus, remembering the general characters of ſimilar objects, he applies them to a new ſpecial caſe, without taking the trouble to aſcertain its diſtinctive features and to mark them by a proper name. Now the compariſon of ſeveral objects and the formation from them of a general notion is a prerogative of thought alone; but the preſervation of the notion for future uſe belongs to language. In the higher truths of ſcience, names are conſpicuouſly uſeful for fixing and, as it were, making portable the reſults of complicated trains of thought. The word *iſomorphiſm* is familiar to chemical ſtudents, and appears in their manuals. It means "power of aſſuming the ſame forms;" and it recalls to them the diſcovery of Gay Luſſac and Mitſcherlich, which could not be explained without many words, that ſome elements either cryſtallize in the ſame form, or may be ſubſtituted for each other in compounds, the proportions remaining the ſame, without change in the form which the compounds aſſume. The reaſonings that ariſe from this law, which throw light upon the nature of the ultimate elements of matter, are greatly ſimplified by our power of carrying it with us as one word; and it is probable that if no attempt had been made to *name* the property, its diſcovery would have been forgotten from the mere difficulty of recalling it to the mind and explaining it to others. The words inertia, affinity, polarization, are ſo many examples of a law conveyed in a name. On the other hand, our eminent anatomiſt, Mr. Owen, complains of the embaraſſments produced in his ſcience, by having to uſe a *deſcription* where a name would ſerve; for inſtance, a particular bone is called by Soemmering "pars occipitalis ſtricte ſic dicta partis occipitalis oſſis ſpheno-occipitalis,"* a deſcription ſo clumſy that we may be certain the bone will not be mentioned more frequently than abſolute need requires. In many caſes, the privilege of giving the name which all the world ſhall employ, is conceded to the man or the nation who firſt clearly perceives the attributes, ſees that they make one notion, and determines how it ſhall be deſignated. We are indebted to the finer obſervation of the French for the names *ennui*, *naïvetè*, and *fineſſe*, for which we have given our own *comfortable* in exchange: and an Engliſhman may notice with a ſmile of ſatisfaction that *das gentlemanlike* makes its appearance in a German author.

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* See Owen on the vertebrate ſkeleton in Report of Britiſh Aſſociation for 1846.

§ 8. But it is not only in the higher laws of ſcience, or the more ſubtle qualities which ſocial refinement developes in men and in ſociety, that the power of naming is the power of fixing the fleeting colours of thought. So long as we are content with the bare reception of viſual impreſſions, we can in a meaſure diſpenſe with words, becauſe our remembrance of the image of each object will ſerve inſtead of its name to ourſelves, and a picture of it may repreſent it, though by a cumbrous and difficult proceſs, to the minds of others. But thought never ſtops with the mere inſpection of objects. In the ſimpleſt caſe, we proceed to *decompoſe* the ſenſitive impreſſion into its parts. The tree which our eyes behold is found upon reflection to be tall or ſtunted, blooming or withered, old or young, ſtraight or gnarled, waving in the wind or ſtill; and theſe properties have no independent exiſtence, but are parts of the viſible object; they are *entia rationis*, and exiſt ſeparately in the mind alone. Whence then is our power of recalling them with ſuch marvellous preciſion and facility? How is it that we can keep them ſafely apart in the mind, inſtead of being obliged to look for them mingled and confuſed, in the objects from which we firſt diſentangled them by reflection? By virtue of the name which we have attached to each of them; which, like the labels upon the chemiſt's jars or the gardener's flowerpots, enable us at once to identify and ſecure the property we ſeek. Names then are the means of fixing and recording the reſult of trains of thought, which without them muſt be repeated frequently, with all the pain of the firſt effort.*

Leibniz was the firſt, ſo far as I know, to call attention to the fact that words are ſometimes more than ſigns of thought; that they may become thoughts. His diſtinction between *ſymbolical* and *intuitive* [*notative*] conceptions† contains a very important law of thinking. Where our notion of any object or objects conſiſts of a clear inſight into all its attributes, or at leaſt the eſſential ones, he would call it intuitive. But where the notion is complex, and its properties numerous, we do not commonly realize all that it conveys; the powers of thinking would be needleſsly retarded by ſuch a review. We think more compendiouſly, by putting a ſymbol in the place of all the properties of our notion, and this naturally is the term by which we are accuſtomed to convey the notion to others. A name then, employed in thought is called a *ſymbolical cognition;* and the names we employ in ſpeech are not always ſymbols to another of what is explicitly underſtood by us, but quite as often are ſymbols both to ſpeaker and hearer, the full and exact meaning of which neither of them ſtop to unfold, any more than they regularly reflect that every ſovereign which paſſes through their hands is equivalent to 240 pence. Such words as the ſtate, happineſs, liberty, creation, are too pregnant with meaning for us to ſuppoſe that we realize their full ſenſe every time we read or pronounce them. If we attend to the working of our minds we ſhall find that each word may be uſed, and in its proper place and ſenſe, though perhaps few or none of its attributes are preſent to us at the moment. A very ſimple notion is always intuitive; we cannot make our notion of brown or red ſimpler than it is, by any ſymbol. On the other hand a highly complex notion, like thoſe named above, is ſeldom fully realized—ſeldom other than ſymbolical. Here then is a ſecond uſe of names; they ſerve to abbreviate the proceſs of thought, as we have ſeen that they are uſeful in recording its reſults. And it may be noticed here that this diſtinction of cognitions throws a new light on the nature of definitions, or explanatory propoſitions, which are not, as they are often regarded, mere explanations to others of a meaning which we ourſelves duly apprehend, but are real acts of thought, which by unfolding before us ſome marks of our conception, partially or wholly unſeen by us, have all the power of new truths even for ourſelves.

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* Upon this, conſult *Damiron* Logique, p. 200, ſeq. and *Duval-Jouve.* Logique, p. 199. ſeq. *Mill* on the Human Mind, vol. i. p. 86.

† *Erdmann's* Ed. p. 79. Acta Erudit. an. 1684.

§ 9. Paſſing over, as ſufficiently obvious, the value of language as a means of communication, let us remark that the power of naming is not its only, and ſcarcely perhaps its greateſt, uſe. Beſides objects and their qualities, we can reproduce in ſpeech the mutual relations of objects, the relations of our thoughts to objects; and laſtly, the order and relation of our thoughts themſelves; for which we muſt employ, in addition to names or nouns, the other parts of ſpeech. Now as the mind never receives impreſſions from without paſſively, but reflects upon them, decompoſes them into their elements, and compares them with notions already ſtored up, language, the cloſe-fitting dreſs of our thoughts, is always analytical,— it does not body forth a mere picture of facts, but diſplays the working of the mind upon the facts ſubmitted to it, with the order in which it regards them. This analyſis has place even in the ſimpleſt deſcriptions. " The bird is flying" is an account of one object which we behold, and its preſent condition. But our object was one thing, whilſt our deſcription mentions two—"bird" and "flying,"—and it is plain that this difference is the reſult of an analyſis which the mind has performed, ſeparating, in thought, the bird from its preſent action of flying, and then mentioning them together.* If painting and ſculpture are conſidered languages,† we have in them language that does not employ analyſis; and a picture or ſtatue would be called by ſome a *ſynthetic*, or compoſitive, ſign, from the notion that in it all the elements and qualities of the object which would have been mentioned ſeparately in a deſcription, are *thrown*

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* See Mr. *Smart's* Sematology, ch. 1, § 3.

† Language is thus divided by M. *Duval-Jouve*, Logique, p. 201,

Languages are
- Natural
  - Abſolute—*Cries* and *Geſtures.*
  - Conventional—*Speech.*
- Artificial
  - Abſolute—*Painting* and *Sculpture.*
  - Conventional—*Emblems, Telegraphic Signs, Hieroglyphics, Writing.*

together and repreſented at one view. The ſtatue of the Dying Gladiator gives at one glance all the principal qualities ſo finely analyſed by the following deſcription, which however includes alſo the poet's reflections upon and inferences from the qualities he obſerves; the *objective* impreſſion is deſcribed, but with a development of the *ſubjective** condition into which it throws the narrator.

" I ſee before me the Gladiator lie:
He leans upon his hand—his manly brow
Conſents to death but conquers agony,
And his drooped head ſinks gradually low—

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* Not to underſtand theſe words is a diſqualification for the ſtudy of modern philoſophy. The *ſubject* is the perſon who receives impreſſions; the *object* is the external thing which gives them. When I ſee a mountain, I am the ſubject, and the mountain the object. Subjective therefore would mean " relating to the mind that thinks;" objective, " relating to the thing thought of." This uſe of the words, though now univerſally followed, is of modern origin; formerly that in which any qualities inhered was called the " ſubject" of them—a very different uſe of the word. See *Trendelenburg*, Excerpta, p. 52. Ed. III. To the paſſages there quoted add *Clauberg*, Logic. p. 63.

And through his ſide the laſt drops, ebbing flow
From the red gaſh, fall heavy, one by one,
Like the firſt of a thunder-ſhower; and now
The arena ſwims around him—he is gone,
Ere ceaſed the inhuman ſhout which hailed the wretch
who won.

"He heard it, but he heeded not—his eyes
Were with his heart, and that was far away;
He recked not of the life he loſt, nor prize,
But where his rude hut by the Danube lay,
There were his young barbarians all at play,
There was their Dacian mother—he, their ſire,
Butchered to make a Roman holiday!
All this ruſhed with his blood—ſhall he expire
And unavenged? Ariſe! ye Goths, and glut your ire!"*

Here the analyſis of the impreſſion is carried to its fartheſt; and in the ſecond ſtanza the *object* becomes quite ſubordinate to the inferences and fancies of the ſubject. But it is all the more ſtriking as an illuſtration of our law, that language is the analyſis, as painting and ſculpture are the imitations, of a ſenſible impreſſion.

§ 10. But different languages are more or leſs analytic, and the ſame language becomes more analytic as literature and refinement increaſe.* This property indicates, as we ſhould expect, correſponding changes in the ſtate of thinking in different nations or in the ſame at different times. With increaſing cultivation, finer diſtinctions are ſeen between the relations of objects, and correſponding expreſſions are ſought for, to denote them. Where the powers of a particular caſe of a ſubſtantive were once ſufficient to expreſs a whole claſs of relations, we find afterwards ſeveral prepoſitions brought in to ſhadow forth the minute differences between them. Again, where the termination of the verb was once ſufficient to denote the perſon whoſe action the verb deſcribed, whilſt the pronoun was only uſed as an additional mark when great emphaſis was required, more modern habits, exalting the notion of perſonality, always aſſign a diſtinct word to the perſon. Thus the Greeks were able to expreſs "I have a pain in my head" by three words, Ἀλγῶ τὴν κεφαλὴν: they needed no word to diſtinguiſh the perſon, and merely qualified the verb by "the head" to expreſs the ſeat of the pain. Our expreſſion analyſes the verb into three notions, "I," the the perſon, "pain," the thing I ſuffer, and "have," the relation; and marks more preciſely by the prepoſition "in" that the head is the ſeat of the pain; ſo that our analyſis is much more complete than that of the Greek. As a language acquires more of this character, and multiplies pronouns, prepoſitions and conjunctions, it begins to forget its inflections, becauſe it can expreſs all their powers by circumlocution with theſe new expletives. As ſyntax becomes more complex, inflections grow ſimpler. Our own language has almoſt loſt the terminations of caſes and perſons; and French writers attribute part of the clearneſs of their own tongue to the ſame feature, and the conſequent neceſſity of determining the relations of words clearly by proper connectives. The Greek language has preſerved its inflections, although it has alſo acquired a full and complicated ſyntax; which is owing probably to the fact that the

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* *Byron's* Childe Harold, Canto IV.

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* See *Donaldſon*, New Cratylus, B. I. ch. 3; *Duval-Jouve*, Logique. p. 203; *Damiron*, Logique, p. 207.

Homeric poems moulded and ſet the former before the neceſſity for the latter had ariſen. Perhaps the Greek of Homer ſhows more than its original ſhare of ſyntax from the touch of later editorial hands, like that of Peiſiſtratus. Here then is a further uſe of language, and a proof of its intimate adaptation to thought. As the diſtinctions between the relations of objects grow more numerous, involved and ſubtle, it becomes more analytic, to be able to expreſs them: and, inverſely, thoſe who are born to be the heirs of a highly analytic language muſt needs learn to *think up* to it, to obſerve and diſtinguiſh all the relations of objects, for which they find the expreſſions already formed, ſo that we have an inſtructor for the thinking powers in that ſpeech which we are apt to deem no more than their handmaid and miniſter.

Language as an instructor.

§ 11. The ſuperiority of ſpoken language over the language of painting and ſculpture, has been the frequent ſubject of remark. One reaſon for it is that whilſt the artiſt can only effect with certainty an impreſſion upon the eye, and muſt depend upon the ſenſibility, often imperfect, of the ſpectators for the reproduction in their minds of the emotions that ſuggeſted his ſubject and guided his hand, the poet by his deſcription can himſelf call up the appropriate feelings. Upon the forehead of the Dying Gladiator what chiſel could inſcribe plainly that which the poet bids us read there?

— "his manly brow
Conſents to death but conquers agony."

In the picture of the Crucifixion at Antwerp, by Rubens, one of the moſt powerful ſpecimens of "the brute-force of his genius," the action and purpoſe of more than one of the figures have been variouſly underſtood, and therefore by one party or another miſunderſtood. It is a diſputed queſtion whether the mounted ſoldier is looking with reverence at the chief Figure, or with cruel calmneſs at the agonies of one of the thieves; and whether the ſoldier on the ladder has broken the legs of the thief, or is preparing to do ſo. Art finds few to underſtand its ſweet inarticulate language; but the plainer and fuller utterances of poetry cannot be miſunderſtood. Another reaſon of its ſuperiority may be found in the greater power of words to *ſuggeſt aſſociations* that knit up our preſent impreſſion with others gained from the paſt, or, better ſtill, bring our emotions and moral feelings into connexion with our preſent impreſſion. What painting of a houſe can ever convey ſo much to a feeling heart as the ſhort deſcription—"This is the home in which I ſpent my childhood?" The ſculptor raiſes a tomb, and covers it with the enſigns of piety and death, but his art tells us leſs after all than the brief inſcription, "He died for his country," or, "he looks for immortality."* The painter cannot dip his pencil in the hues of the ſpirit; the ſculptor's drill and chiſel cannot fix in matter the ſhapes which the mind aſſumes. The artiſt's thought remains unexplained, or depends upon the caſual advent of congenial interpreters. In the comments upon our famous pictures and ſtatues I read ſo many acknowledgments of the inferiority of the language of art to that of ſpeech. Art would need no commentators, if it were thoroughly competent to tell its own ſtory.

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* Compare *Couſin*, Philoſophie du Vrai, *&c.* Leçon 27; and *Burke*, on the Sublime, § vii. 5.

§ 12. But great as are the ſervices which language performs for thought, it muſt not be ſuppoſed that an examination of the rules of language would anſwer every purpoſe of a logical ſyſtem. As we are now conſtituted, our thoughts are invariably clothed in ſpeech; we uſe words even if we do not utter them. But if articulate ſpeech were withdrawn from man, it cannot be ſuppoſed that thought would for ever ceaſe. On the contrary, wherever perſonal defects or external circumſtances deprive the mind of this means of communication, it ſucceeds in providing an efficient ſubſtitute, and attains by practice much the ſame facility in the uſe of it as we enjoy in the exerciſe of the powers of ſpeaking. Thoſe among the deaf-and-dumb who have been taught by the pains of an enlightened humanity to converſe and to think, muſt uſe, inſtead of the remembered words which we employ, the remembered images of hands, in the various combinations of finger-ſpeech, as the ſymbols of their thoughts. The deaf-and-blind, taught the names of objects from raiſed letters, muſt think, not by aſſociations of ſound but of touch. The telegraph, and the ſignals on railroads, are new modes of ſpeech; and though an inexpert practitioner may have at firſt to tranſlate ſuch ſigns into common language, the ſkill which comes from practice ſoon prompts him to omit this needleſs intermediate ſtep. The engine driver ſhuts off the ſteam at the warning ſign without thinking of the words to which it is equivalent; a particular ſignal becomes aſſociated with a particular act, and the interpoſition of words becomes ſuperfluous. Dr. Hooke, the inventor of the telegraph, called it "a method of diſcourſing at a diſtance, not by ſound but by ſight;" and it is conceivable that we might learn to think by the telegraphic ſignals, ſo that "red flag over blue," ſeen with the eye or recalled by the memory, might be our *word* for happineſs. Leibniz* ſuggeſts the poſſibility of employing various tones inſtead of articulate words to convey our notions; and mentions that the Chineſe, having a ſlender vocabulary, uſe the aid of tone and accent to vary and augment it. The *Ranz-des-vaches* that rends aſunder the heart of the Swiſs exile, to him is but a *word* for "country and home;" and the ſignet of the king ſent to his ſervant, or the broken *aſtragalus*, by which the "gueſt-friend" reminded his fellow of his plighted hoſpitality, are ſigns which plainly and certainly ſuggeſt thoughts, and therefore they are words alſo. Without thought, language would ceaſe; but we can conceive the language we uſe might be denied to us, and yet thought ſtill proceed with the aſſiſtance of ſome other claſs of ſigns. And it is ſcarcely philoſophical to found an analyſis of the reaſoning powers upon that which, however uſeful to the reaſon, may be conceived to be univerſally, as it is now in iſolated caſes, ſeparated from it, without deſtroying its action. Granting that the proceſſes of thought may be traced to a great extent in the ſigns which it employs, they are ſtill but ſigns, and if the proceſs beneath them can be examined in itſelf—as we need not fear to maintain that it can—then to view it only in the inſtruments it uſes is to leave our ſurvey ſhallow and incomplete. Logic ſhould expound the laws of thinking, and univerſal Grammar the laws of ſpeech, apart from their ſpecial modifications in any given language. Theſe two ſciences would mutually illuſtrate each other; whilſt a clear ſeparation between them would probably have the effect of elevating the latter into an importance not hitherto aſſigned it. No confuſion can reſult from introducing principles of language into Logic, as has been often done, ſo long as thinking is made the adequate object matter of the ſcience, and language comes in only as the miniſter of thought; indeed as the general principles of Grammar are very ſeldom laid down, they muſt either be picked up from logical works or learnt imperfectly by natural acuteneſs.

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* Nouv. Eſſ. iii. 1.

The queſtion we have juſt conſidered—whether thinking could proceed without articulate words as its ſigns—muſt be diſtinguiſhed from the more difficult one—whether thinking could diſpenſe with *all* ſigns. The latter we do not pretend to anſwer here; but it may be hinted that thinking and ſcience are not identical, that even if trains of ſyſtematic reaſoning are quite beyond the reach of any but a ſpeaking, "word-dividing" being, the ſimpler acts of thought may perhaps be within his reach. Without language, all the mighty triumphs of man over nature which ſcience has achieved would have been impoſſible. But this does not prove that man might not, without ſpeech, obſerve objects, gather them into groups in his mind, judge of their properties, and even deduce ſomething from his judgment. Weak and incomplete the proceſs of thought would be; but we dare hardly ſay that one could not think at all.

§ 13. But in no ſubject is it more neceſſary to diſtinguiſh between the actual, and the merely conceivable. Language and thought have never been put aſunder, but in a few exceptional caſes. With ſome nations they have the ſame name; with all, the rules of the one are readily applied to the other.

There are two oppoſite views of the origin of language, which ſeem equally erroneous, as ſuppoſing that thought has actually been ſeparated from ſpeech.* The one aſſerts that man could not have *invented* ſpeech, becauſe it obeys the laws of reaſoning, and reflects them in examples; but reaſoning cannot be developed and perfected without language, therefore language muſt have been previouſly given: and indeed it would ſeem impoſſible that men ſhould agree to invent language without *having* language in which to communicate to each other the agreement. Language therefore was an original gift of the Creator, and the development of thought followed the poſſeſſion of it.

But we muſt either ſuppoſe that at the

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* *Rauch's* Pſychology, p. 229. New York. 1840. 8vo.

time of the gift the mere word had power to convey a conception to the mind, whereas all experience teſtifies that a new and ſtrange word conveys abſolutely nothing: or elſe that the words were taught before there were any conceptions to fit them, as the mother makes clothes for her unborn ſon, and that thoughts were adapted to them by degrees. Either alternative is ſo ſtartling that men are apt to fly to a contrary opinion, and to maintain that the different families of men invented for themſelves arbitrarily, by the power they poſſeſs of imitating natural ſounds, ſuch words as they required to repreſent their notions; in proof of which, appeal is made to the great diverſity of languages. But this opinion, puſhed to its fulleſt extent, preſents a difficulty not more eaſily diſpoſed of than the other. It aſſumes that men had notions and conceptions before they found names for them, as the view we have juſt left ſuppoſed names for which correſpondent notions were yet to be found; and we have ſeen already that the mind needs the aid of language in forming and preſerving its conceptions.* Surely the marriage of thought and ſpeech need not be thus nullified. A more reaſonable account, and one which ſacred hiſtory fully warrants, is that the gift of reaſon, once conveyed to man, is the common root from which both thought and ſpeech flow, like the pith and the rind of a tree, to be developed in inſeparable union. He who created Adam gave him this power, and then brought all the beaſts of the field to him " to ſee what he would call them: and whatſoever Adam called every living creature, that was the name thereof."† In the fulleſt ſenſe, language is a divine gift; but the power and not the reſults of its exerciſe, the germ and not the tree, was imparted. A man can teach names to another man, but he cannot plant in another's mind that far higher gift—the power of naming, which demands nothing leſs than a divine power. From the firſt we have reaſon to believe that theſe two functions went together. A conception received a name; a name recalled a conception; and every acceſſion to knowledge of things expanded the treaſures of expreſſion. And we are entangled in abſurdities by any theory which aſſumes that either element exiſted in a ſeparate ſtate, antecedently to the other.

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* Compare pp. 42 ſeq.

† Gen. ii. 19. On this Section ſee *Rauch*'s Pſychology, pp. 227—233. The hiſtorical grounds of the queſtion we do not examine. Comp. M. *Duval-Jouve*, Logique, §§ 189, ſeq. According to *M. Couſin* language began when ſome cry or geſture, produced inſtinctively at firſt in conſequence of ſome inward feeling or impreſſion, was produced *voluntarily* upon the recurrence of the ſame feeling, with a view to expreſs it. This is the element of all that is conventional in language. See Frag. Philoſoph. ii. on *Maine de Brian*.

OUTLINE OF THE LAWS OF THOUGHT.

INTRODUCTION CONCLUDED.

§ 14.

L*OGIC has been called an* a priori *ſcience.* The diſtinction between truths *a priori* and truths *a poſteriori*, as obſerved univerſally by modern writers, may be drawn as follows. If there are any truths which the mind poſſeſſes, whether conſciouſly or unconſciouſly, before and independent of experience, they may be called *a priori* truths, as belonging to it *prior* to all that it acquires from the world around. On the other hand, truths which are acquired by obſervation and experience, are called *a poſteriori* truths, becauſe they come to the mind *after* it has become acquainted with external facts. How far *a priori* truths or ideas are poſſible, is the great *campus philoſophorum*, the great controverted queſtion of mental philoſophy. In entering into it, and that only ſo far as our preſent purpoſe requires, we muſt remove from it one great cauſe of miſunderſtanding. No one at preſent maintains that the mind can know any thing at a point of time before its obſervation of external things began; a mind in that condition would be full of thick darkneſs. However independent of experience any proceſs may appear to be now, as for inſtance, that by which geometrical truths are proved, we may be ſure that we made much uſe of obſervation before we educed the very laws which place it in our minds far above all need of confirmatory evidence from obſervation.* A mind which never obſerved, would not be a mind. But the queſtion is whether even the facts which we obſerve do not furniſh evidence that ſomething has been in the mind before it was directed to the facts; juſt as we know by looking at ſomething that we have eyes, and muſt have had them before we looked, although without putting them to their proper uſe we could never have known that we had them at all.* Now without going into the diſpute as to how much of our knowledge is *a priori*, we may be able to ſhow that at leaſt the conditions of all knowledge are ſo, — that the mind does not ſimply reflect the images of things without, but impreſſes characters of her own upon them,—that our knowledge of things is not the exact counterpart of the things, but of the things and the mind operating together. When we ſee our image in a mirror, (to uſe Bacon's ſimilitude) we know that our ſhape is the cauſe of it on the one ſide and the power of reflection in the mirror on the other; if we were to ſee it multiplied, or increaſed, or diminiſhed, or changed in hue, we ſhould infer that the mirror had ſeveral angular faces, or was concave, or convex, or made of tinted glaſs. Each of theſe properties would be inherent in the mirror *prior* to our preſenting ourſelves before it; they are its *a priori* laws; although we could only aſcertain them *a poſteriori*, by a trial. When an image is received upon the mirror of the mind, we ſee that the latter alſo has its laws and properties. Our remark upon one object of common occurrence is "the bird is flying againſt the wind." Have we here no more than the ſingle object which the eye preſents? There are three diſtinct notions, of a bird, of its being in the act of flying, of the direction of its flight; ſo that the mind has decompoſed the one object into three impreſſions; and there is beſides an act of deciding upon the agreement of theſe impreſſions, expreſſed by the word "is." And as the object does not reſolve *itſelf* into three parts, but is to all intents and purpoſes one, and as there can be nothing in the object to correſpond to the act of judging expreſſed by the word "is," we conclude that the power of analyſis of the ſimple impreſſion into three, together with that of judging upon it, belong to the mind itſelf. Further, as we have no reaſon to think that this object created the two powers, or did more than call them into action, we conclude that they were preſent *a priori*, that is, prior to the impreſſion from without. And again, for the ſame reaſon that they are not found in this object of ſenſe,—that is, becauſe they decompoſe it into many parts and judge upon its parts, which no object can do for itſelf—we conclude that they were not learnt from any object we may have ſeen before; and therefore they are abſolutely *a priori*, they are independent of all experience.*

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* See p. 3.

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* *Coleridge.* Lit. Rem. i. 326; and Friend, i. 307, note.

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* The various modes of expreſſing the antitheſis between thoughts and things are here exhibited in a tabular form.

Man, .	as oppoſed to	Nature
Thoughts,	„ „	Things
Theories,	„ „	Facts
Reflection,	„ „	Senſation
Subject,	„ „	Object
Form,	„ „	Matter.

Whewell's Phil. of Ind. Sci. vol. I. B. i.

Hence we may underſtand the importance which attaches to Leibniz's well known comment on the maxim of the ſchool of Locke;* to the *nihil eſt in intellectu, quod non fuerit in ſenſu*, he adds—*niſi intellectus ipſe*. The mind does not ſimply receive the impreſſions of the ſenſes, like the paſſive ſurface of a mirror; it groups them, judges about them, ſeparates their qualities from each other, and draws inferences about the qualities which like objects, hitherto unknown, may be expected to have. But qualities, claſſes, inferences, are not objects of ſenſe, however they may reſide in or be drawn from thoſe objects. They have no ſeparate exiſtence out of the mind; whilſt, within it, they are perfectly diſtinct. This tranſmutation of objects of ſenſe into their elements muſt therefore be the work of the mind alone. It is a law of the intellect itſelf, and never was nor can have been in the ſenſuous impreſſions we have received.

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* *Leibniz.* Nouveaux Eſſais. ii. 1. p. 223. Erdmann's Ed. *Locke* himſelf admits "ideas of reflection," gained by obſerving the mind's own actions, beſides "ideas of ſenſation." On Hum. Under. II. vi. 1.

Pure Logic treats only of theſe laws or conditions to which objects of ſenſe are ſubjected in the mind; and hence it is called an *a priori* ſcience. It unfolds the laws of the *intellectus ipſe*, and gives no account of the impreſſions of the ſenſes.* It will enumerate, for inſtance, all the different kinds of judgments which can be formed, but will not pretend to decide upon the truth of any one judgment reſpecting ſomething which is now before the eyes. As the laws of the underſtanding are few and invariable, whilſt the phenomena in the world around us appear, from our imperfect knowledge of their complicated laws, very uncertain, Logic is far leſs liable to error than thoſe ſciences which have to do with external facts. Thus the truth that "if A is B and B is C, then A muſt be C," cannot be denied, whatever we ſuppoſe theſe letters to repreſent. The formula is univerſal and neceſſary; it was ſo in the days of Ariſtotle, and will be as long as there remains upon the face of the world one mind to think. But an *a poſteriori* ſcience —a ſcience of external facts—like Aſtronomy, though uſing demonſtration, depends upon obſervation, and the accuracy of its calculations is in a direct ratio to her opportunities of obſerving all the circumſtances which may affect them. It can never be a neceſſary truth that after each interval of two hundred and twenty-three lunations the ſun will be eclipſed; grounded only upon facts, whenever ſome convulſion ſhall be prepared by the Creator to diſturb them, its prediction will fail. Calculations of the period of the return of comets have ſometimes failed, becauſe of our defective means of obſervation; thus the return of the comet of 1770 was promiſed in five years and a half; it falſified the prediction, and never returned at all.

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* Compare p. 26.

This view of Logic as an *a priori* ſcience, it is hoped, will meet with a general aſſent; and we purpoſely abſtain from touching the great queſtion of Metaphyſics—how much of our knowledge is from the mind itſelf and how much from experience. The conflicting opinions upon this matter will never be reconciled, and perhaps the beſt ſervice which philoſophy could receive would be rendered by marking out the region which muſt be mutually ceded by the oppoſite ſchools.*

§ 15. *Uſes and Pretenſions of Logic.* The acts of the mind are ſo quick, ſo numerous, ſo complex, that they are not eaſy to note and deſcribe, although we daily perform them, and that without ſerious miſtake. Logicians have generally erred on the ſide of underrating the number both of the mental proceſſes themſelves, and of the particular acts which go to the attainment of any judgment or conception. As the act of ſtanding erect, ſo ſimple apparently, calls into operation a very numerous array of muſcles, by means of which the body perpetually ſways and adjuſts itſelf, without the mind's being conſcious of any effort, ſo we may believe that the mind goes through acts, which from long practice ſcarcely awaken her own attention, much leſs the ſenſe of pain and effort, yet which involve a great number of ſubordinate acts, depending on diſtinct principles. And as it takes the phyſiologiſt many pages of explanation, to analyſe a poſture which a three years' child aſſumes and retains without difficulty, ſo the logician ſeems to ſpend too many words upon the rules of thinking, ſince all men, from the ſtateſman to the clown, are able to think, whether they have learnt rules or not. To ſhow that the complexity we ſpeak of really belongs to thoughts apparently very ſimple, it may be neceſſary to examine an example. When Captain Head was travelling acroſs the Pampas of South America, "his guide one day ſuddenly ſtopped him, and, pointing high into the air, cried out 'A lion!' Surpriſed at ſuch an exclamation, accompanied with ſuch an act, he turned up his eyes, and with difficulty perceived, at an immeaſurable height, a flight of condors ſoaring in circles in a particular ſpot. Beneath this ſpot, far out of ſight of himſelf or guide, lay the carcaſs of a horſe, and over that carcaſs ſtood, as the guide well knew, a lion, whom the condors were eyeing with envy from their airy height. The ſignal of the birds was to him what the ſight of the lion alone would have been to the traveller, a full aſſurance of its exiſtence."* Here was an act of thought which coſt the thinker no trouble, which was as eaſy to him as to caſt his eyes upward, yet which from us, unaccuſtomed to the ſubject, would require many ſteps and ſome labour.

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* Before leaving the ſubject, it muſt be noticed that the term *a priori* has undergone important changes of meaning. In *Ariſtotle's* philoſophy the general truth is "naturally prior" (*πρότερον τῇ φύσει*) to the particular, and the cauſe to the effect; but ſince *we* know the particular before the univerſal, and the effect before we ſeek the cauſe, the particular and the effect are each "prior in reſpect to us" (*πρότερον πρὸς ἡμᾶς*). Anal. Poſt. I. ii. Top. VI. iv. Metaphyſ. v. (Δ) xi. p. 1018. Ed. Berol. Following this, the Schoolmen call the argument which proceeds from cauſe to effect, *a priori* demonſtration. But with *Hume* (Sceptical Doubts) *a priori* has the ſenſe given in the text, which *Kant* has fixed in the language of philoſophy. See *Trendelenburg's* Excerpta, p. 81, Ed. III. *Sir W. Hamilton's Reid,* p. 762.

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* *Sir J. Herſchel's* Prelim. Diſcourſe. p. 84.

The ſight of the condors convinced him that there was ſome carcaſs or other; but as they kept wheeling far above it inſtead of ſwooping down to their feaſt, he gueſſed that ſome beaſt had anticipated them. Was it a dog or a jackal? No; the condors would not fear to drive away, or ſhare with, either; it muſt be ſome large beaſt, and as lions abounded, or had been ſeen in the neighbourhood, he concluded that one was here. Theſe ſteps of thought at leaſt, and probably many more, ruſhed through his mind with the proverbial ſwiftneſs of thought, but they were ſummed up in the words "A lion." Daily and hourly we run through ſimilar or more complicated trains of thinking, with no more conſciouſneſs of the ſeveral links than the organ-player has of each note he ſtrikes in a rapid paſſage of full harmony. As the logician profeſſes to give an account of the thinking proceſs, he muſt try to follow all theſe out, and ſhow the laws on which they ſeverally depend. He may incur the charge of tediouſneſs in ſhowing (for inſtance) that our notion of "houſe" in general, is formed by the ſucceſſive ſteps of Compariſon, Reflection, Abſtraction and Generalization, for every one has been forming ſuch general notions all his life without knowing one of theſe hard names; or that "he will come, for he ſaid he would" contains three terms and three propoſitions, joined together by a ſign of inference, which ſhould appear in a certain order; for we can all manage our inferences without theſe formalities. But ſtill he muſt not ſhorten his explanation at the expenſe of truth; theſe are laws of thought, and it is his buſineſs to aſcertain them, juſt as the phyſiologiſt thinks himſelf bound to examine all the rules of the bodily motions and poſitions ſo unconſciouſly aſſumed. But is there any gain to mankind from this analyſis? Would not natural logic ſuffice, without a number of technical rules, uninviting to learn, hard to remember, and ſeldom applied? What is the *uſe* of Logic?—I anſwer, that knowledge itſelf is a uſe, and that all legitimate enquiry rewards itſelf with its own pleaſures. The appetite for finding out laws from facts, cauſes from effects, neceſſary truth from fleeting occurrences of the day, puts in its claim to gratification, which is as legitimate, if leſs imperious, as that of the animal nature for food and ſleep. The ſtudies which enwrapt the ſoul of Archimedes in the ſiege, of Aquinas at the royal feaſt, of Joſeph Scaliger during the maſſacre of Saint Bartholomew's, muſt have been a ſource of pleaſure, pure and high, from which they had a right to draw. If the queſtion, What "fruit" does it bring?—which the Baconian philoſophy puts ſo often, be underſtood, as it certainly ought not, to refer only to the *material* wants and comforts of humanity, it is a baſe, ſordid and ſtupid queſtion, againſt which every better mind indignantly proteſts. Science was never brought to its preſent height by hopes of wealth, plenty and comfort alone, but chiefly by thoſe *mirabiles amores* with which ſhe can inſpire her followers. He who loves to ſee the proceſſes of his mind reduced to their laws and cauſes, to him are logical ſtudies a pleaſure—to him they bring fruit.

But whilſt even the coldeſt followers of Bacon* admit that the value of ſcience muſt not be eſtimated by what ſhe can actually perform, no doubt it muſt be granted that even the higheſt ſciences do condeſcend to help our loweſt wants. Aſtronomy, Chemiſtry, Geology and Mechanics not only furniſh delightful contemplations to the ſtudent, but they put food into the mouths of the vulgar; they clothe them, and fill their purſes, they put houſes over their heads, and adorn them with objects of beauty and convenience. Logic has its uſe alſo in improving the condition of men; it teaches, or perhaps I may only ſay, may be made to teach, them to think. This is often denied, and partly on account of the extravagant claims put forward by logicians, who aſſume that the acquiſition of a few logical rules will enable men to think correctly, juſt as the poſſeſſion of a watch enables them to aſcertain the hour. No ſcience can make ſuch pretenſions. The active intellect has two parts, one of which originates our thoughts, and may be called the ſuggeſtive, whilſt the other checks and judges thoughts as they ariſe, and may be called the critical, power. Thoughts are continually ſuggeſted without the conſent of the will. One would think indeed, were it not for the obvious ſimilarity theſe ſpontaneous viſitors bear to the matter of former ſtudy, that they were in no ſenſe our own, that an independent being, over whom one had abſolutely no control, was whiſpering within us. In the poetical temperament, where the power of ſuggeſtion ſtrongly predominates, the thoughts which ariſe are leſs like any thing one remembers, than in ordinary minds; and hence poets have maintained, perhaps in full ſincerity, that an unſeen ſpiritual power, higher than themſelves, uſed them as the channel of its teaching,—that they were inſpired.* The ſuggeſtive power may be educated as certainly as, though more gradually than, the critical. The diſcovery which we call a flaſh of genius, a happy thought, really depends as much upon previous acquirements, as the power of ſtating a caſe or applying a rule does. Theſe bright ſuggeſtions never occur to the ignorant;* they have the facts before them, but their imaginations are not trained to leap to the proper inference from them. All diſcipline of the ſuggeſtive muſt proceed from the critical power; it is by a long, careful, patient analyſis of the reaſonings by which others have attained their reſults, that we learn to think more correctly ourſelves.

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* See *M. Comte,* Philoſophie, iii. p. 280, as againſt the brilliant but (I think) miſtaken view of Bacon and the old philoſophers, in *Macaulay's* Miſc. Eſſays. "Bacon."

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* *Plato* again and again mentions this claim of poets. See Ion, 533, D. Apol. Soc. 22, B. C. Legg. 719, C.

Meno. 99, B. C. Phædrus, 245, A. *Stallbaum* (Preface to Ion) does not think that *Plato* would deny to the poet a modifying power over the dictating principle. But the truth is, *Plato* ſtill allows them all they claim, in order that the abſence of voluntary action (*αὐτοπραγία*) in all they do, may be ſeen and deſpiſed. Compare *Ovid.* (Faſti. vi. 5) *Cicero* (de Div. i. 37). *Morgenſtern* (de Rep. p. 296). Dictation and inſpiration are diſtinguiſhed, *Coleridge's* Table Talk, ii. 30.

* See this beautifully illuſtrated in *Whewell*, Phil. Ind. Sci. B. xi. § 5.

He who reads over a work upon Logic probably thinks no better when he riſes up than when he ſat down; but if any of the principles there unfolded cleave to his memory, and he afterwards, perhaps unconſciouſly, ſhapes and corrects his thoughts by them, no doubt his whole powers of reaſoning gradually receive benefit. Perhaps the principal advantage which ſcience has received from Bacon's great work, has ariſen from his denouncement of haſty generalization,* which being eaſily remembered, and applicable to all ſubjects, has much influenced the practice of all ſcientific ſtudents who have become acquainted with it. In a word, every art, from Reaſoning down to Riding and Rowing, is learnt by aſſiduous practice, and if principles do any good, it is proportioned to the readineſs with which they can be converted into rules, and the patient conſtancy with which they are applied in all our attempts towards excellence.

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* Nov. Organ. I. 19. 20. 22. Not that *Bacon* firſt diſcovered this abuſe of the law of Anticipation. *Plato* knew it well enough. Philebus. 16. E. *οἱ δὲ νῦν κ.τ.λ.* and has ſtated it almoſt in the ſame way.

No one will pretend to ſay that Logic has been fairly treated in this reſpect. Our view of the elements of Logic has indeed been very imperfect, and would be quite inſufficient for ſcientific analyſis; but no attempt has been made to widen and improve it, becauſe we have not tried to put it to uſe, and ſo ſhewn its inadequacy. In ſome popular treatiſes, of lateſt date, both Engliſh and French, the rules of ſyllogiſm are paſſed lightly over, as ruſty weapons that have no place in the armoury of ſcience—"You will find them ſomewhere—in Ariſtotle, in the Schoolmen, or in Manuals—we admit their exiſtence, but to teach them is beſide our purpoſe—we preſent you only with a ſmall ſpecimen or two for curioſity's ſake." This courſe is to us unintelligible. The rules in queſtion claim to be thoſe which regulate the act of reaſoning; if a ſyſtem profeſſes to teach reaſoning, it ſhould either give us the rules complete, or prove that they are falſe or defective. A large book on Logic that refers us to another book for the rules of the great logical act, does not fulfil its duty; and ſuggeſts a ſuſpicion that theſe rules have not been made uſe of as the inſtrument of ſcientific reſearch—that proper trouble has not been taken to aſcertain how far they are really applicable to ſuch a purpoſe, and how far abſurd and uſeleſs. I believe that if a ſet of rules, as free from technicalities of form and expreſſion as is conſiſtent with complete accuracy, be ſeduloufly applied to the examination of the books we read, more eſpecially to the hiſtory and theory of ſome particular ſcience, the mind will receive great and ſignal benefit, and the creative powers will be increaſed as well as the judgment ſtrengthened. In paſt days it was worth while to learn the ſcholaſtic terminology, becauſe it ran through all ſcientific practice; the theology and metaphyſics of Aquinas and Occham vindicate their right to ſpend time upon the barbariſms of their Logic. Let us get by degrees a logic which is to our philoſophy, what that of the Schoolmen was to theirs, and no one will complain that ſome of its expreſſions are technical and its rules hard to underſtand. Technicalities are only weariſome, where we have no hope of their after-fruits to lure us through them.

On theſe grounds, we try to make the analyſis of thinking as complete as poſſible, and beg the ſtudent to maſter a few new names, expecting that the trouble ſo beſtowed will not be grudged as a preparation for that habitual examination of thoughts and arguments which is the great means of teaching us to reaſon. For, the rules of Logic, thoſe of ſyllogiſm for example, do not teach a new trick of argument, nor furniſh an inſtrument by the poſſeſſion of which we are at once enabled to ſpeak or diſpute. There is neither trick nor magic in them; they are principles which we call into uſe every hour of our lives. They do not impart any new faculty, but lay bare before us the nature of that reaſoning which has been from childhood our delight and our prerogative. Who ſhall ſay that this is a frivolous or unworthy ſtudy?

§ 16. But it is thought adviſable that

young men who are not inclined to examine with habitual patience their own thoughts or the procedure in any of the real ſciences, ſhould acquire ſome ſlight knowledge of Logic. In this caſe, we cannot expect the ſame diligence in learning technical terms and rules, as they will not be required hereafter. The difficulties of mode and figure will be reluctantly maſtered, becauſe in popular language no one mentions them. But what is the courſe adopted? We attenuate the ſcience, where we ought to ſimplify it; we reduce the ſize of our manuals in the vain hope of leſſening their difficulty: and there remains little more than a catalogue of hard terms with harder explanations—little elſe than a reliquary of the dry bones of that ſyſtem of knowledge which five hundred years ago was alive and breathing. No wonder that untrained minds are repelled. Inſtead of explanation and illuſtration of common things, they find the plaineſt and ſimpleſt veiled behind the terms of a forgotten metaphyſical ſyſtem; they are commanded to maſter all the rules required for an extenſive practice of logic, though they never mean to enter upon ſuch a courſe, and are not encouraged to do ſo now, except by the moſt puerile examples. Surely it is not worth their while to learn the language of a region of philoſophy in which they are never to travel. Surely it would be poſſible to give them ſome ſound and accurate inſtruction in the nature of their thoughts and minds, making uſe only of the language of common life. Every art and ſcience has the right to form its own terms; but neceſſity can alone juſtify the exerciſe of it. New facts and laws require new words, but he who hides a well-known thing by a ſtrange name, makes truth ridiculous by the robe of mock dignity he clothes her with. Only in the hope that the nomenclature of logic which the following pages contain may become familiar by a ſteady courſe of logical practice, do I invite my reader to maſter it. But where there is to be *no* practical application of the rules, it would be adviſable to ſtudy ſome popular work, in which the leading principles only of mental or phyſical ſcience are familiarly expounded. A book like Sir J. Herſchel's Preliminary Diſcourſe on Natural Philoſophy carefully read will do more to expand the mind than years of toilſome ſtudy of the technical rules of thought purſued without that practice of logical analyſis which is its natural complement.

§ 17. In the diviſion of the ſubject, I ſee no cauſe to deviate materially from the ordinary diſtribution into three parts, the firſt treating of Conception, or the power of forming general notions, the ſecond of Judgment, or the power of deciding whether two notions agree or not; and the third of Syllogiſm, or the power of drawing one judgment from another. To theſe a fourth part, in which Method, or the power of uſing the other three functions in the diſcovery of truth, is explained, has been added; which anſwers to the applied Logic of the preſent work. But it is proper to notice one or two objections to this diviſion.

In beginning with conceptions, we are charged with putting the laſt, firſt.* Men cannot get a clear conception without paſſing a judgment about it; nor can they always paſs a judgment without certain reaſonings, or ſyllogiſms; ſo that we go to the third part of Logic to eſtabliſh what belongs to the ſecond, in order that from that we may more clearly underſtand ſomething which relates to the firſt. Why not *begin* then with the third?

Whilſt this regreſſive order is certainly natural, and whilſt a Logic might be written which ſet out from the ſentence or the ſyllogiſm, and analyſed it into judgments, and then again into conceptions; the contrary procedure from the ſimpleſt element of reaſoning, the conception, to the ſyllogiſm which is its complete act, will be found in our opinion eaſier to follow. The analyſis has long ſince been performed, and we find it convenient to proceed by ſyntheſis, in this as in many other ſciences. But the objection is valuable, as bringing out the contraſt between the natural courſe of reaſoning and its technical explanation. Why do we reaſon? To find whether ſome judgment, which has ſuggeſted itſelf to our minds, be true or not. Why do we ſeek to make this judgment? To add ſomething to the clearneſs of the notion that is its ſubject. Copernicus reaſoned to prove that the globe revolved round the ſun; and he eſtabliſhed this judgment that when men thought of "the globe" in future they might know it as "the revolving globe." All the reaſonings in Ariſtotle's Ethics are to give a more adequate notion of happineſs;—of Plato's Republic, to improve our notion of juſtice;—of Bacon's Organon, to afford a more accurate conception of Method.

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* *Kant* throws out this objection; but it applies to his own treatiſe on Logic, if to any.

§ 18. Another objection againſt the diviſion is that it diſtinguiſhes parts which are really confuſed;* that, for example, when we divide ſuch a conception as that of "gaſes" into inflammable and non-inflammable, we really paſs a judgment, though we explain diviſion in the firſt part of Logic, which treats of Conception.

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* *Damiron*, Logique, p. 4.

The anſwer to this may be ſuggeſted by that to the preceding one. We do not deny that the proceſſes of the mind run into one another, that a man judges when he forms conceptions, and ſo on; we only aſk for leave to *deſcribe* each proceſs ſeparately. Our arrangement is confeſſedly artificial.

Some logicians indeed argue that properly ſpeaking Judgment is no diſtinct act of thought, but rather a part and condition of every act. Every notion ſeems to imply a judgment; when I think of the Queen, gravitation, or virtue, I mean that the Queen—gravitation—virtue *exiſts*; ſo that we have one common attribute which we affirm of every thing, that of exiſtence. But it is one thing to ſay that a judgment *may* be, and another that it *is*, made. The diſtinction between a complex notion and a judgment is that whilſt in the one ſeveral attributes have been brought together already, in the other we formally bring a ſubject and its attribute together. My notion of freedom implies that it is the ſtate of being able to do as I will, having reſpect however to the rights of others, and that this is a ſtate poſſible for men; but I do not formally *affirm* either that it contains theſe attributes or that it is poſſible, and therefore my mentioning freedom involves no judgment, although I may if I pleaſe form judgments about it. We muſt carefully diſtinguiſh between a poſſible and an actual judgment—between a notion which is and one which may be the ſubject of a judgment.

§ 19. Method, which is uſually deſcribed as the fourth part of Logic, is rather a complete practical Logic. Whilſt the other three parts deſcribe each a diſtinct and complete product of thought, the Conception, the Judgment, and the Syllogiſm, no ſuch whole is treated of in the doctrine of Method; which may be uſed for making a whole ſcience, or a whole ſpeech, a ſyſtem or a ſentence. Method is rather a power or ſpirit of the intellect, pervading all that it does, than its tangible product.* Hence we put in the place of rules for Method as a *part* of Logic an Applied Logic, which ſhows under what conditions in the ſeveral regions of enquiry the three acts of thought may be ſafely performed; and how far rules can avail to direct the mind in the uſe of them to profitable or beautiful reſults.

The attempt to apply the rules of Logic will both raiſe and lower the opinion which obtains concerning the worth of the ſcience. Thoſe who condemn it altogether, as wholly arbitrary and artificial, as a ſet of rules for arguing, put together in an age when truth was leſs the object of deſire than argument, may find to their ſurpriſe that it is only a ſearching and ſyſtematic account of proceſſes which they daily perform, whether in thought, or in argument, in the purſuit of a ſcience or in the tranſactions of the ſtreet and market. Thoſe on the other hand who expect that Logic will be to them a golden key to unlock the treaſure houſe of the knowledge of the univerſe, will find that it neither gives them nor pretends to give, any new power; that it only refines and ſtrengthens powers they already poſſeſs; that out of a dunce it never yet made a philoſopher. Whilſt its rules apply to every ſcience, and it may therefore lay ſome claim to its ancient titles—the Art of Arts, the Inſtrument of Inſtruments—it only aſſiſts us in the ſtudy of the ſciences, not ſtands in their ſtead. We muſt fight our own way over every inch of ground in the field; but Logic will often prevent our throwing away our blows. She can do no more. Sophiſts of Greece may offer to teach us "a trick worth a hundred minæ," which is to be the ſecret of all wiſdom; or Lully and Bruno may pretend ſo to arrange in tables the reſults of human reſearch that a child may know where to put his hand on the moſt recondite ſecrets, and employ them at pleaſure. But theſe are wild dreams of the infants of ſcience, which thinkers in their ſober, waking moments hardly mention but with a ſmile. We only affirm that when men think, theſe are the rules according to which their thoughts run, that the knowledge of laws and principles, independent of ulterior profit, is always gratifying to active minds, and that inaſmuch as the clear underſtanding of what is right, is always uſeful for the avoidance of what is wrong, Logic is an uſeful inſtrument in thinking. But it gives us the forms of knowledge, not the matter. It will not lay bare the hidden ſprings of moral action; nor explain the myſtery of life, of ſleep, of fancy, of memory; nor diſplay the future deſtination of man and the world. Still leſs will it be to us inſtead of eyes, if, turning away from this ball of earth on which we ſtand, we try to look off to the Infinite — the Abſolute — the Eternal, whoſe nature will not take the mould of our intellectual forms, who comprehends us, when we vainly think that we comprehend Him.

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* See the fragment on Method in *Coleridge's* Friend, vol. iii.

OUTLINE OF THE LAWS OF THOUGHT.

PART I.

CONCEPTIONS.

> " Non obſtant hæ diſciplinæ per eas euntibus, ſed circa illas hærentibus."
>
> QUINCTILIAN.

CONCEPTIONS.

§ 20. *Cognitions in General.*

THE want of any manual of Metaphyſics to which we might conveniently refer, compels us to explain here the names of the ſimpleſt mental impreſſions, in as far as Logic preſuppoſes the poſſeſſion of them.

The impreſſion which any object makes upon the mind may be called a Preſentation. Some Preſentations are admitted into the mind without being noticed, as is the caſe with the words ſpoken to a dreamy or abſent man, or with a houſe or tree which, forming part of a great landſcape, eſcapes the ſpecial notice of the beholder. The mind is unconſcious of them; it ſees or hears, but does not know that it ſees or hears, ſo that the impreſſion is not clear. And yet it is a real impreſſion, becauſe when attention is directed to it, we know that it muſt have been there before. A man ſtares his friend in the face without recognizing him; his friend awakens his attention, and that inſtant he becomes conſcious of what is before him. But he knows that it is not the impreſſion upon his eye which begins at that point of time, but his attention to the impreſſion. Preſentations then are divided into Clear and Obſcure, and the former, with which alone Logic is concerned, may be called Notions or Cognitions.

Clear Preſentations, or Cognitions, are ſubdivided into confuſed and diſtinct. Where the marks or attributes which make up the Preſentation cannot be diſtinguiſhed, it is confuſed; where they can be diſtinguiſhed and enumerated, it is diſtinct. For example, we have a clear notion of the colour red; but we cannot tell by what marks we identify this colour—we could not deſcribe it intelligibly to another, and hence our cognition of it is confuſed; again, we have a clear notion of houſe, but we can declare its various marks, namely, that it is an encloſed and covered building, fit for habitation; and therefore our notion is diſtinct.

We ſubdivide the claſs of diſtinct notions twice, according to two principles of diviſion; and firſt, into adequate and inadequate notions. Adequate notions are thoſe in which, beſides enumerating the marks, we can explain them; that is, can enumerate the marks of the marks of the diſtinct notion, and again the marks of thoſe marks. As this kind of analyſis is almoſt interminable, we call a notion adequate, not when the enumeration of ſubordinate marks has been carried to the fartheſt, but when they have been enumerated ſufficiently for our preſent purpoſe, in whatever ſubject we are employed. Our notion of happineſs, for inſtance, (according to Ariſtotle) is adequate, when we not only know that it is "an energy of the ſoul according to the beſt virtue, in a perfect life;" but can explain what we mean by an energy of the ſoul, the beſt virtue, and a perfect life. So we have an adequate notion of what Hobbs means by Right, when we not only know that it is "unreſiſtible might in a ſtate of nature," but can explain what unreſiſtible might and ſtate of nature are. The ſame two notions would be inadequate, if we had the reſpective definitions of them, but could not explain them.

The other diviſion of diſtinct notions is into ſymbolical and notative; it has been already explained.*

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* P. 47. ſeq. Throughout this ſection we have followed *Leibniz*, with ſome ſlight alterations. See *Erdmann's Leibniz*, p. 79. Acta Erudit. an. 1684. Some uſeful diſtinctions in the various names of notions, are given by *S. T. Coleridge*. Why are we ſtill expecting the fragment on Logic from his pen, ſo long promiſed?

"The moſt general term (*genus ſummum*) belonging to the ſpeculative intellect, as diſtinguiſhed from acts of the will, is Repreſentation, or (ſtill better) Preſentation.

"A conſcious Preſentation, if it refers excluſively to the ſubject, as a modification of his own ſtate of being, is = Senſation.

"The ſame if it refers to an object, is = Perception.

"A Perception immediate and individual is = an Intuition.

"The ſame Mediate, and by means of a character or mark common to ſeveral things is = a Conception.

TABLE OF NOTIONS.

- Preſentations
  - Clear (=Cognitions)
    - Confuſed.
    - Diſtinct
      - Adequate
      - Inadequate
      - Symbolical
      - Notative.
  - Obſcure.

§ 21. *Intuitions and Conceptions.*

The notions which the mind forms from things offered to it are either of ſingle objects, as of "this pain, that man, Weſtminſter Abbey;" or of many objects taken together, as "pain, man, abbey." Notions of ſingle objects are called Intuitions, as being ſuch as the mind receives when it ſimply attends to or inſpects (*intuetur*) the object. Notions formed from ſeveral objects are called Conceptions, as being formed by the power which the mind has of taking things together (*concipere* i.e. *capere hoc cum illo*).

"A Conception, extrinſic and ſenſuous, is = a Fact or a Cognition.

"The ſame purely mental and abſtracted from the forms of the underſtanding itſelf is = a Notion." *Church and State*, p. 301.

§ 22. *Formation of Conceptions.*

On inſpecting two or more objects of the ſame kind, we begin to compare them with one another, and with thoſe which are already repoſited in our memory; and we diſcover that they have ſome points of reſemblance. All the houſes, for example, which come in our way, however they may differ in height, length, poſition, convenience, decoration, have ſome common points;—they are all covered buildings, and fit for the habitation of men. By attending to theſe points only, and abſtracting them from all the reſt, we arrive at a general notion of houſe, that it is a covered building, fit for human habitation; and to this notion we attach a particular name, houſe, to remind us of the proceſs we have gone through, and to record its reſults for uſe.* The general notion ſo formed we call a Conception; the common points we obſerved in the various objects are called Marks or Notes; and the proceſs of obſerving them and forming one entire notion from them is termed Abſtraction.

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* See p. 42. ſeq.

Abſtraction, as we have deſcribed it, would include three ſeparate acts; firſt, an act of Compariſon, which brings ſeveral intuitions together; next, one of Reflection, which ſeeks for ſome marks which they all poſſeſs, and by which they may be combined into one group; and laſt, one of Generalization, which forms the new general notion or conception. Kant however confines the name of Abſtraction to the laſt act of the three; others apply it to the ſecond. It is not of much conſequence whether we enlarge or narrow the meaning of the word, ſo long as we ſee the various ſteps of the proceſs. The word means a *drawing-away* of the common marks from all the diſtinctive marks which the ſingle objects have.

§ 23. *On the nature of general Notions.*

There is a pretty general agreement at preſent as to the mode of the exiſtence of general notions. Formed in the mind, they are not entirely dependent upon its mere arbitrary deciſion; becauſe in moſt caſes there are properties in the objects around us which compel us to generalize in a particular way. Every nation, for example, would without any expreſs convention put men into one claſs and horſes into another, becauſe the common properties of men are ſo marked and ſtriking, that they ſeem as it were to cry aloud to be claſſed together. No one would be abſurd enough to neglect ſuch ſimilarities; and to put ſome men and ſome horſes invariably into one claſs, becauſe they were white, and ſome other men and ſome other horſes into one claſs becauſe they were black! General notions are widely accepted in proportion as they are founded upon realities, and formed from important common properties in the objects. The botanical ſyſtem of Linnæus has been found defective, from its claſſes being baſed chiefly upon accidental and leſs important properties, the number and poſition, namely, of the ſtamina and piſtils of plants; ſince a conſiſtent adoption of it would ſever many claſſes of plants which are obviouſly and naturally related, and throw together others which in form, ſize, and all the more obvious characters, differ widely. Its inventor himſelf is often compelled to deviate from his own principle, to obey a more natural rule of claſſification. General notions exiſt in the mind alone; but they are founded on common properties which exiſt without the mind, not in a ſeparate ſtate, but as inherent in the objects of intuition. Further, theſe common properties were given to the various objects by deſign. For example, when the ſame vertebral column is found in a hundred ſpecies of animals, ſometimes joined to large and powerful limbs, ſometimes to ſmall, rudimental ones, now to wings, now to fins, and now to arms, ſometimes carried vertically, ſometimes horizontally; and when, amidſt all the ſpecific variations, many of them modifying its own ſtructure, the vertebral column is eaſily recognized as fundamentally unchanged, it is natural to infer that the poſſeſſion of this part of the frame was pre-ordained to be the link of connection of theſe ſpecies, and that in forming a claſs of "Vertebrate Animals" we are ſeeking after a form or idea which was in the Divine Mind when animals were created. So that general notions exiſt without the mind of man, in as far as they are in another mind. The divine Mind ſtamps them on material things; the human reads them there.

Such is our account of that queſtion which cauſed centuries of acrimonious diſpute—Do genera and ſpecies really exiſt? To underſtand the poſitions of the Nominaliſt and Realiſt, the controverſy muſt be ſtudied hiſtorically; we muſt try to put ourſelves in the ſame point of view as each diſputant occupied; otherwiſe we ſhall be inclined to caſt aſide as mere trifling a diſpute on which the deepeſt truths of religion were felt at the time to depend.

Have genera and ſpecies a real, independent exiſtence, or are they only to be found in the mind? The Realiſt anſwers that they exiſt independently; that beſides the individual objects and the general notion from them in the mind, there exiſt certain "ideas," the patterns after which the ſingle objects are faſhioned; and that the general notion in our mind is the counterpart of the idea without it. A good action, for example, is good, becauſe it partakes of the idea of goodneſs, and we underſtand good actions in as far as we have the idea of goodneſs copied in our own intellect; even a table or chair is formed according to the "very table," or the "*tableneſs*" (if we may imitate the jargon of the Schoolmen)—the pre-exiſtent idea of a table, of which the artificer's deſign was but an imperfect counterpart. Such is the Platonic Realiſm. As we leave the hiſtory of the doctrine for another place, we need not ſhew under what modifications it appeared in the ſcholaſtic philoſophy. But its difficulties muſt not be paſſed over. Where are theſe ideas repoſited? In the Divine Mind? or is there, as it were, ſome general atmoſphere of reaſon, in which they float, and which both the creating and the created minds inhale? If the latter, how do you connect the ideas with the things which belong to them? Many however think that Plato adopted the former opinion. What general notions are to our minds, ideas are to the ſupreme reaſon (νοῦς βασιλεύς); they are the eternal *thoughts* of the Divine Intellect, and we attain truth when our thoughts conform with His—when our general notions are in conformity with the ideas.* Interpreted in this way, perhaps our readers will find little to object to in the Platonic Realiſm.

The ultra Nominaliſt declared that nothing exiſted except things and names of things; and that univerſals had no exiſtence except as names.† But it muſt be admitted that general names are inſeparably attached to general qualities; unleſs indeed they are purely arbitrary. Between the individual objects and general names, we muſt inſert the notions for which the names ſtand; between Socrates and the name "man" there is our notion of the properties which make a man. Moderate Nominaliſts cannot have overlooked this, and with them, names would always imply certain properties.*

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* See *Stallbaum*. Proleg. to *Plat*. Parm. p. 269, ſeq.

† For the Nominaliſm of *Roſcelin*, who is regarded as the founder of the doctrine, ſee *Couſin*. Introd. to *Abelard*, p. 86. ſeq. For earlier Nominaliſt theories, ſee *Renouvier*, Hiſtoire, II. 210. 213. 215.

But if ſome of them avoided the abſurdity of ſuppoſing that general names need not ſignify general notions, Roſcelin, who maintained that "things have no parts," may very well have held, as Abelard interprets him, that names imply no properties; and at any rate, the title of Nominaliſt is likely to lead to the miſtake. Accordingly, the Conceptualiſts, with Abelard at their head, aſſigned to univerſals an exiſtence, independent of ſingle objects, but dependent upon the mind of the thinking ſubject, in which they were notions or conceptions. This, we apprehend, is only moderate Nominaliſm under an apter title.†

Making allowance for much confuſion of ſtatement in the ſcholaſtic writers, and for extreme aſſertions which, there is reaſon to think, their authors underſtood in a modified ſenſe, we have two views of the nature of general notions; that of the Realiſt, who maintained that they exiſt in the mind and alſo without it—in the Divine Mind; and that of the moderate Nominaliſt,[*] who held that they exiſt only in the mind as notions, and that we uſe names to fix and recall them. Now I venture to think that the interminable conteſt between Platoniſt and Ariſtotelian, Realiſt and Nominaliſt, is, at bottom, not ſo much a queſtion of what univerſals are, as of how they ſhall be treated; not ſo much a queſtion of Metaphyſics, as of Method. Upon the *nature* of general notions there is a large amount of agreement between the parties: the Realiſt believes, with the Nominaliſt, that they are in the human mind, whilſt, if the Nominaliſt believes at all that the world was created by deſign, he can ſcarcely eſcape from recognizing the Realiſt poſition, that ſuch ideas as animal, right, motion, muſt have had their exiſtence from the beginning in the creative mind. Whence then the controverſy? The burden of Ariſtotle's objections to the Platonic ſcheme of ideas is, that it teaches what cannot be known, and gives out as certain truth what lies far beyond the reach of our powers of inveſtigation. "Inſtead of being content" he would ſay to the Platoniſt, "with claſſifying particular objects ſo as to form general notions, which we could always compare with the objects, as being inſeparable from them, you jump to certain ideas, ſeparate from the objects, though they cauſe and determine the manner of their exiſtence, fixed whilſt theſe are changeable, eternal whilſt theſe paſs away. Be it ſo; you offer theſe tranſcendent ideas to our underſtanding—you muſt remove the difficulties which the underſtanding meets in receiving them. How do you know that they exiſt? For we muſt not, in order to

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* Thus *Occham* founded his Nominaliſm upon the poſition, "*Nullum univerſale eſt aliqua ſubſtantia extra animam exiſtens.*" Logica I. 15.; which has little to do with mere names.

† *Couſin.* Ouv: d'Abel: Introd. page 180.

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[*] Like *Occham*. Of the earlier ſpeculations of *Roſcelin*, reputed an extreme Nominaliſt, who held that univerſals were only *flatus vocis*, we have but ſcanty and doubtful accounts.

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* So *Occham*—"*Entia non ſunt multiplicanda præter neceſſitatem.*"

explain the world which we ſee, deviſe another world, of ideas, which no eye has ſeen.* Again, how are they connected with the things to which they belong? The man, for inſtance, with the idea of humanity? to ſay that things 'participate' in, or 'are copies' of, the ideas, is to avoid the difficulty by vague metaphorical language. Muſt there be an idea for every ſenſible object? If ſo, before Socrates could be born, there muſt have been an eternal idea of Socrates; which would lead us to a multiplication of ideas too great even for the imagination. In a word, you cannot explain the properties of theſe ideas without vagueneſs and ſelf-contradiction; and therefore, ſhould not aſſume them to exiſt and found a ſyſtem upon them."*

If this view be correct, Ariſtotle does not ſo much intend to deny the exiſtence of ideas, as to maintain that the evidence for them is inſufficient, and that no ſyſtem can ſtand ſecure upon ſo weak a foundation. And looking to the paradoxical and ſeemingly inconſiſtent ſtatements of Plato on the one hand* and the evident miſapprehenſions of Ariſtotle upon the other, I can conceive it poſſible that a ſage mediation might have reconciled theſe two great ſpirits; and Ariſtotle might have owned that the univerſal notions in his mind might anſwer to certain ideas in the Divine, whilſt his illuſtrious maſter might have confeſſed that, putting revelation out of the queſtion, there is no way to the abſolute—to knowledge of the ideas—except

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* Compare, Metaphyſ. XIII. (M). 4, p. 1078, b. Ed. Berol. Ibid. 5, p. 1079, b. 36. Ibid. I. (A) 6, p. 987. Ibid. 9, p. 990, b. *Ravaiſſon,* Metaphyſique d'Ariſtote, III. ii. 2. *Renouvier,* Hiſtoire, II. p. 42. To avoid miſunderſtanding, let me remark that the reſemblance between Ariſtotle and the Nominaliſt lies only

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in his denying a *ſeparate* exiſtence to univerſals. His doctrine of Form and Matter, and his diſtinct definitions for the thing (τὸ τί ἦν εἶναι) and the notion of it (τὸ τί ἐστι), prove that he knew that univerſal *properties exiſted without the mind.*

* For he ſpeaks of the ideas, now as if they were merely mental conceptions, now as independent exiſtences. *Stalbaum's* Parmenides: Prol. p. 273. And he does not clearly explain *where* the ideas exiſt, and whether they depend on the Divine Mind or It upon them. Ibid. p. 272.

a careful obſervation of, and reaſoning from, the facts before our eyes. As we ſaid in the outſet—the queſtion chiefly concerns Method, and does not turn ſo much upon a belief in the exiſtence of ideas, as upon the right to aſſume them as the ground of teaching.

When at a later period the battle was fought about religion, as it had been about ſcience, the Schoolmen ſeem to have been partly influenced by the ſame views. When Occham maintained that general notions only exiſted in the human mind, he did not puſh this doctrine to its apparent conſequences, and aſſert that there was no Divine Mind; becauſe he was thinking rather of the place which they were to hold in teaching, than of the poſſible modes of their exiſtence. The ſpirit of his objections to Realiſm is—"The attempt to explain univerſals as independent natures involves us in logical difficulties and contradictions."[*] Nor is it clear that even Roſcelin held the heretical opinions which were deduced from his logical principle, that words and individual things were the only realities. Perhaps it was ſome zealous adverſary who inferred that he applied to the bleſſed Trinity what he only meant for a logical rule in treating of earthly things, and who left him the unwelcome choice between Sabellianiſm and Tritheiſm, according as he regarded the Eternal Perſons as words or independent beings. At all events he himſelf repudiated the charge of Tritheiſm, actually brought againſt him.*

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[*] Logica. I. xv.

If the controverſy is thus reſolved into the queſtion, whether we are to be content with things as known by the ſenſes—and our obſervations on them, or are to interpret them by certain higher exiſtences, which we call ideas, it aſſumes a high degree of importance. The Nominaliſt is not a ſtrange monſter, ſtanding alone in time, and ſpeaking a ſenſeleſs jargon. In Bacon and Comte we behold his deſcendants, though in the latter the family features are growing exaggerated. So the

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* *Errorem ſuum abjuraverat. Anſelm.* Was it ever *ſuum?*

Realiſt may know his offſpring in many a myſtical and "tranſcendental" thinker. The problem of reconciling the two views, by combining what is good in each, is worthy of the moſt philoſophic intellect, even at this very day.*

§ 24. *Queſtions about Conceptions.*

When a conception is recalled to the mind, under what form does it appear? Under that of a bare word, or of all the marks which we abſtracted to form it, or of ſome ſingle object uſed as the repreſentative of all the others of the ſame claſs?† We have ſeen already‡ that the word or the array of marks may be employed to recall the conception. In any propoſition which conveys a definition, we have examples of both forms. In ſuch a ſentence as "honeſty is uprightneſs in all dealings which reſpect property," the former of the two conceptions is uſed as a counter* to repreſent the marks, which the latter explicitly conveys; in the phraſeology adopted above,† "honeſty" is a ſymbolical, and "uprightneſs in dealings which reſpect property" a notative conception. As to the third opinion, the underſtanding, which for convenience' ſake puts ſymbols for true conceptions, does on the ſame account put examples of a conception inſtead of the conception itſelf, the ſingular inſtead of the general. For the notion animal, I think of a particular horſe or cow; for honeſty, of ſome honeſt man; for juſtice, of ſome Brutus or Ariſtides; for city, of London or Paris; but always with a conſcious reſervation that there are many points about this particular caſe which are not general, and do not belong to the conception. But it will hardly be queſtioned by any, that the underſtanding can, by a ſomewhat ſeverer ſelf-controul, throw aſide the particular caſe, and retain only the common marks which belong to the whole conception. For we muſt admit the power of abſtracting ſome marks from the reſt, as the *having life* which is the mark of *animal* is abſtracted from the thouſand different circumſtances of ſize, ſhape, colour, food, temper, which diſtinguiſh animals from each other; elſe how are conceptions formed? And if we can abſtract the marks from the accidents, ſurely we can retain them in our graſp when abſtracted.

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* Upon the hiſtory of Nominaliſm and Realiſm may be conſulted—*Brucker*, vols. iii. and vi. *Tennemann's* Manual. The brilliant Preface by *Couſin* to "Ouvrages inedits d'Abelard." Paris, 1836. Alſo *Couſin*, Leçons. 1829, Leç. 9. In *Degerando*, Hiſtoire, I. p. 235, there is a good account of the ſhades of opinion in the two parties. *Sir W. Hamilton's Reid*, p. 405. *Dugald Stewart*, Phil. of Human Mind, vol. I. ch. 4, §. 2. *Brown's* Lectures. Biſhop *Hampden's* Bampton Lectures: Lecture II. and Notes.

† *Bp. Berkeley*. Principles, &c. §§. xi. xii.

‡ See p. 47, ſeq.

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* *Notionis teſſera. Bacon.*

† P. 47.

ii. Are repreſentations of the imagination —the notion we have of a landſcape from ſome poetical deſcription, for example—to be conſidered as intuitions or conceptions? If the deſcription could be ſo complete, and the reader's apprehenſion ſo accurate, that every portion of the landſcape were diſtinctly ſeen, and we could diſtinguiſh that ſcene from every other, even from one that reſembled it moſt cloſely, then it would be in accordance with the definition we have given (§ 21) to call it an intuition. But this, I ſuppoſe, is never the caſe. The poet can deſcribe a lake-ſcene with diſtinctneſs enough to prevent our having an impreſſion from it of any other *kind* of landſcape, as a plain with a diſtant city, or the cliffs of the ſea ſhore. But ſtill the deſcription muſt be far too obſcure to prevent our miſtaking this lake-ſcene from one cloſely reſembling it, or even our putting ſome lake we remember, to ſupply the deficiencies of his delineation, although we know that we are adopting one ſcene, whilſt he drew another. He can limit our general notion of landſcape to ſome particular ſpecies, but not to this individual landſcape—can reduce our "all" to "ſome," but not to "this." Therefore, ſuch an image is a conception, uſed *particularly*, i. e. only ſome *part* of it is called up. It is a repreſentation of ſome landſcapes, but not of *one* landſcape, to the excluſion of the poſſibility of confounding it with others.

iii. Can there be abſtraction without generalization, as Archbiſhop Whately maintains? "Suppoſe we are ſpeaking of the preſent King of France," ſays he; "he muſt actually be either at Paris or elſewhere; ſitting, ſtanding, or in ſome other poſture; and in ſuch and ſuch a dreſs, &c. Yet many of theſe circumſtances (which are *ſeparable* accidents, and conſequently) which are regarded as *non-eſſential to the individual*, are quite diſregarded by us; and we abſtract from them what we conſider as eſſential; thus forming an *abſtract* notion of the Individual. Yet there is here no generalization." A great error lies hid in this paſſage—that of not perceiving that the power of ſeparating circumſtances called eſſential to the individual from thoſe which are not ſo, reſults from former generalizations. How do we know that "ſitting" or "ſtanding" is not eſſential to a king? How do we know that a crown and a robe of ſtate are ſeparable from the King of France? By prior generalization; by the help of the conception we have formed of a king already. If we had never known of other kings, or the ſame king at other times, we ſhould have looked on the accidents and eſſentials of the King of France, as alike eſſential. We know that "ſitting" is not eſſential, from hearing that kings ſometimes do not ſit. There is no abſtraction without generalization; and in the caſe before us, we abſtract, to refer to a former general notion or conception.

§ 25. *Higher and Lower Conceptions.*

The functions of Abſtraction do not ceaſe as ſoon as we have compared ſeveral intuitions, to form one conception. We may proceed to form a larger conception from ſeveral narrower ones; and this too is done by Abſtraction. By obſerving John, Thomas, and Peter, and abſtracting from their accidents the eſſential marks, we get the notion of man; but again, by comparing the conception man with other conceptions, cow, ſheep, wolf, whale, and obſerving the mark common to all, that they ſuckle their young, we form the wider conception Mammalia,—wider, becauſe it includes man and many other conceptions. We may carry the proceſs farther ſtill; and, with writers on Natural Hiſtory, compare the Mammalia, with Aves, Amphibia, Piſces, Inſectæ, and Vermes, when we ſhall diſcover that all theſe, however different, agree in having life and ſenſation, from which marks we gain the new conception animal, wider than any of the former, as including them all,—higher, as requiring a ſecond ſtep in the abſtractive proceſs to reach it.

It is convenient to figure wider and narrower conceptions by concentric circles. Here let three ſuch circles be ſuppoſed; then the outmoſt will repreſent Animal, the middle Mammalia, and the inmoſt Man.

§ 26. *Co-ordinate Conceptions.*

Two conceptions, neither of which contains the other and which are both contained under a higher one, are called co-ordinate. Thus Mammalia and Inſectæ, being contained in Animal, are co-ordinate conceptions.

The co-ordinate ſpecies of a genus are not always upon the ſame level, and equal in dignity to each other. If animal be defined

" ſubſtance having life and ſenſation," the two ſpecies, man and polyp, are in a very different poſition with reſpect to this definition, ſince man has many marks not mentioned in it, polyp ſcarcely any; and the definition of the genus would almoſt deſcribe completely this meaneſt ſpecies in it.

§ 27. *Genus and Species.*

Genus and ſpecies are relative terms; a conception is called, in relation to its ſuperior, ſpecies—to its inferior, genus.

The *ſummum genus* of logicians is the laſt reſult of the abſtracting proceſs, the genus which can never be in turn a ſpecies. The *infima ſpecies* is the ſpecies which cannot become a genus;—which can only contain individuals, and not other ſpecies.[*] But there can only be one abſolute *ſummum genus*, whether we call it " thing," " ſubſtance," or " eſſence." And we can ſcarcely ever aſcertain the *infima ſpecies*, becauſe even in a handful of individuals we cannot ſay with certainty that there are no diſtinctions on which a further ſubdiviſion into ſmaller claſſes might be founded.

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[*] *Porphyr.* Iſag. ii. Pacian diviſion.

§ 28. *Extenſion and Intenſion.*

When we compare a vague and general conception with a narrower and more definite one, we find that the former contains far more objects in it than the latter. Comparing plant with geranium, for example, we ſee that plant includes ten thouſand times more objects, ſince the oak, and fir, and lichen, and roſe, and countleſs others, including geranium itſelf, are implied in it. This capacity of a conception we call its extenſion. The extenſion of *plant* is greater than that of *geranium*, becauſe it includes more objects.*

But conceptions have another capacity. Whilſt plant has more objects under it than geranium, it has fewer marks in it. I can

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* Mr. *Mill,* Logic I. vii. I, thinks it only "accidental" that "general names" ſhould be the names of claſſes. But his own language contradicts him; if they are *general* they belong to *genera;* it cannot be accidental that a claſs-name ſhould be the name of a claſs.

Scheme of CONCEPTIONS *in the two wholes of* EXTENSION *and* INTENSION.

		Name.	A. Intenſion, i. e. the *marks* which compoſe the Conception.	B. Extenſion, i. e. the *objects* which the Conception ſtands for.
Genus	Summum .	*Body* .	. Body . . .	Stone, Plant, Brute, Man, &c.
	Subalternum.	*Living body*.	Body with life . . .	Plant, Brute, Man.
	Subalternum.	*Animal* .	Body with life and ſenſation . .	Brute, Man.
Species	Infima .	*Man* .	. Body with life, ſenſation and reaſon. .	Man.

In the Summum Genus the Intenſion is leaſt, the Extenſion greateſt. In the Infima Species the Intenſion is greateſt, the Extenſion leaſt.

deſcribe the leaves, petals, ſtamina, and piſtils of geranium; but of plant no ſuch deſcription is poſſible. I cannot ſay that every plant has a ſtem, for there are the lichens to contradict me; nor a flower, for ferns have none, and ſo on. I can ſay little more about plant, than that all plants have growth and vegetable life. The logical expreſſion of this defect is, that its intenſion is very limited.

The greater the extenſion, the leſs the intenſion; the more objects a conception embraces, the more ſlender the knowledge which it conveys of any of thoſe objects; and *vice verſâ.*[*]

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[*] The various modes of expreſſing the double capacity of conceptions, which has been called by *Sir William Hamilton* "the cardinal point of Logic," are as follows.

A conception viewed as a

Logical whole	Metaphyſical whole
has	has
Extenſion	Intenſion or Comprehenſion
Breadth	Depth
Sphere	Matter
Objects	Marks
Power to denote.	Power to connote.

With the help of the important diſtinction between extenſion and intenſion, or as others expreſs it, the ſphere and matter of the conception, *magnitudo et vis conceptûs*, we can underſtand the meaning of the ſaying—that the ſubject of a judgment is in the predicate, and the predicate in the ſubject. "Man is an animal;" this conveys two notions, that man is contained in animal, as a ſpecies in a genus; and that whatever makes up our notion of animal—all the marks of animal—are contained in (ὑπάρχει*) man. So they are mutually contained.

§ 29. *Determination.*

The reverſe of the abſtractive proceſs, that of deſcending from higher conceptions to lower, by reſuming the marks laid aſide, is called determination. Thus from the broad claſs of diſeaſes, we determine or mark out the claſs of fevers, by the peculiar ſymptoms of heat, rapid pulſe, &c., which are their marks; and from fevers we deſcend further to intermittent fevers, by bringing in the freſh mark of time.

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* *Ariſtotle* (Anal. Pri. I. i. and many other places) adopts in preference this mode of putting the propoſition. Inſtead of "Man is an animal," he has "Animal inheres in man."

As abſtraction augments the extenſion by diminiſhing the marks, ſo determination augments the intenſion by increaſing them. Notions of individuals, and they only, are ſaid to be fully determined, becauſe to them there are no more marks to add. The uſe of the word determination in its logical ſenſe is already ſanctioned by our older writers.

§ 30. *Privative Conceptions.*

Beſides conceptions which are formed from marks, there are others formed from the privation or abſence of marks. Our notion of kindneſs ariſes from ſome marks which a kind perſon always exhibits; but whence our notion of its oppoſite unkindneſs? From the want of the marks, whatever they may be, of kindneſs. So too, in marking by a name any claſs of objects, as animal or ſtone, we neceſſarily imply that there are correſponding claſſes, which are *not animals* and *not ſtones;* about which, it is true, we know very little, as we can only ſay what they are *not*. Any pair of conceptions, a poſitive and a privative, muſt, ſpeaking abſolutely, divide the whole univerſe. Either in man or in not-man, all objects muſt be found,—ſtar, flower, form of government, or moral quality. But practically we limit this abſolute diviſion. We never think, for inſtance, of including an oak-tree among the number of things that are not kind, though undoubtedly it does lack the marks of kindneſs. It is more convenient to think of ſuch a pair of conceptions as kind and not-kind, not as dividing between them the whole univerſe, but only ſome wider conception, as moral-beings. So that we mean to include in our notion of unkind, not every *thing* which is unkind, but every *moral being* that is ſo. Such a larger conception, which a poſitive and privative divide between them, may be called the ſecond ſphere of the poſitive.*

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* The δευτέρα οὐσία of *Ariſtotle* (Categ. ch. v.) may juſtify the term *ſecond ſphere*. Profeſſor *De Morgan*

§ 31. *Logical Diviſion.*

To enumerate the various co-ordinate ſpecies of which a genus is compoſed, is to *divide* ſuch genus. Three rules are to be obſerved for correct diviſion.

i. The conſtituent ſpecies, called the dividing members *(membra dividentia)* muſt exclude one another.

ii. The conſtituent ſpecies muſt be equal, together, to the genus divided *(diviſum)*.

iii. The diviſion muſt be made according to one principle *(fundamentum diviſionis)*.

The validity of theſe rules depends upon the fact that logicians teſt every diviſion by the poſſibility of reducing the conſtituents to two, a poſitive and privative. If A is a genus diviſible into the ſpecies x, y and z, we may repreſent the dividing members as x and not-x, the latter being really equivalent to y and z. This diviſion into two members,

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propoſes to call it the *univerſe* of the poſitive conception. The privative has been called by ſome the contradictory, by others the contrary, of the poſitive. But either expreſſion tends to confound conceptions with judgments.

called dichotomy (διχοτομία) is alone purely logical, becauſe we know *a priori* (i. e. without any reſearches into the particular caſe) that it muſt be correct. But on the other hand, it is comparatively uſeleſs, becauſe, of one of our conſtituents, and that the larger, we know nothing, but that it wants the marks of the other.* "Inſincerity" connotes† nothing, except that it has not that mark or marks which ſincerity has. The firſt and third rules are not abſolutely neceſſary, but deſirable with a view to dichotomy. Exceptions to the firſt rule are ſometimes imperatively called for. In enumerating the ſpecies of imaginative writers, one would probably mention poets, dramatiſts and writers of tales, yet ſome poets are dramatiſts, and ſome tales are poems; ſo that the ſpecies are not mutually oppoſed, but overlapping—or as Leibniz* would ſay, *communicant* ſpecies.

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* Compare the mode of ſtating this objection in *Plato*, Politicus, 262, C. D. τοίονδε οἷον . . . τῶν σχισθέντων. If, as *Raſſow* and *Waitz* ſuppoſe, *Ariſtotle* has *Plato* in his mind in cenſuring the diviſive method, as uſeleſs in the diſcovery of truth, (ſee An. Poſt. II. ch. 5, and An. Pri. I. ch. 31,) we believe that *Plato* ſaw its defects perfectly.

† i. e. implies no notes or marks. See *Mr. Mill's* Logic.

The "principle of diviſion" mentioned in the third rule is the point of view from which we regard the conception to be divided. For we may divide one many times, in various points of view; thus man may be divided into European, Aſiatic, African, American, and Auſtralian; or again, into Chriſtian, Mohammedan, and Pagan; or again, into juſt and unjuſt; and in the firſt diviſion, locality, in the ſecond, religion, and in the third, behaviour is the principle of diviſion. It is always ſome ſecond conception, for the marks of which we ſearch in the conception to be divided. Now a diviſion might happen to be right which was made on two principles; for inſtance, I might rightly divide the people in ſome iſland, into Europeans and Polygamiſts. But it would be more difficult in ſuch a caſe to reduce to a dichotomy. If we wiſhed to ſubſtitute in ſuch a caſe Europeans and not-Europeans for Europeans and Polygamiſts, it would be difficult to aſcertain that ſome of the Polygamiſts were not alſo Europeans.

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* Op. XIX. Ed. Erdmann.

§ 32. *Reſolution and Partition.*

Beſides the mode of dividing the ſphere of a conception, deſcribed above, another kind of diviſion is poſſible, called for diſtinctneſs' ſake, reſolution of a conception. It conſiſts in the ſeparation of the marks of a conception, as diviſion was the ſeparation of its ſpecies. It analyſes the intenſion or connotation as diviſion does the extenſion or denotation. It divides the matter, as diviſion the ſphere. Thus we reſolve the conception weapon into its two marks, that it is an inſtrument, and uſed for offence; but divide it into cutting, ſtriking, and miſſile weapons.

After the reſolution of a conception, it may be included in one higher one by this mark, and in another by that. Hence it appears that a lower conception may ſtand in the relation of ſpecies to different genera, according as abſtraction fixes on one ſet of marks or another. Thus weapon is ſeen to ſtand under the two genera of inſtrument, and things which give offence.

The ſeparation of the parts of any individual object, as of a ſword into blade and hilt, is termed partition. An individual (ἄτομον) is that which cannot be divided without ceaſing to be what it is; its parts cannot have the name of the whole. When a genus is divided every part of it remains unchanged, and may have the name of the genus.

§ 33. *Uſe of Conceptions. Diſtribution.*

Though all conceptions are univerſal, they may ſtill have a particular *uſe;* in other words, we can think of part only of a conception inſtead of the whole, when the convenience of thought requires. Where we repreſent, judge of, or reaſon from, a whole conception, it is ſaid, in technical language, to be *diſtributed;* where a part only is treated, we call it *undiſtributed.*

§ 34. *Abſtract and Concrete Repreſentations.*

Abſtract and concrete are relative terms;

when a higher conception is ſeen to exiſt in a lower, or in an intuition, as we ſee the marks of animal in the conception horſe or a horſe, we are ſaid to ſee the abſtract in the concrete. So of two cognate conceptions, the more abſtract bears the name of *the abſtract*, the more determined (§ 29) we call *the concrete.*

The received explanation among logicians in this country is that an abſtract term is the name of a quality conſidered apart from the ſubject in which we ſhould look to find it, as prudence, ſtrength; and that a concrete term is a name expreſſing the quality as reſiding in ſome ſubject, as prudent, ſtrong. There is an analogy between this narrow ſenſe, and that aſſigned by us; we ſay that the abſtract is to the concrete as univerſal to particular, and they, that it is as the general quality to particular caſes of it.*

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* See the excellent note in *Trendelenburg*. Excerpta: on § 36. Alſo *Waitz* on Organon. Comm. on 81. 6. 3. *Trendelenburg* on Ar. de Anima, 478.

OUTLINE OF THE LAWS OF THOUGHT.

PART II.

JUDGMENT.

> Οὐδεμίαν γὰρ οὔτε οὕτως οὔτ' ἐκείνως πρᾶξιν οὐδ' ἀπραξίαν δηλοῖ τὰ φωνηθέντα, πρὶν ἂν τις τοῖς ὀνόμασι τὰ ῥήματα κεράσῃ.
>
> Plato.

JUDGMENT.

§ 35. *Judgment Defined.*

EVERY act of judgment is an attempt to reduce to unity two cognitions. When one decides that "Socrates is wiſe," it is that hereafter one may, by combining the two notions, think of "the wiſe Socrates." Again, when one decides that "the world is not eternal," it is that hereafter one may refrain from combining the two notions as "the eternal world."

A Judgment then is an expreſſion that two notions can or cannot be reconciled—that the marks of the one may or may not be henceforward aſſigned to the other.*

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* This definition is attacked by Mr. *Mill*, Logic, vol. 1. p. 116, ſeq. on the ground that a judgment ex-

Though the truth or falſehood of a Judgment, and conſequently its value, depend upon its correctly repreſenting things without us, rather than thoughts within us, it is primarily concerned with thoſe repreſentations in the mind by means of which alone things are brought into the arena of thought, whether as ſingle objects or as the ground of abſtract and general notions.

Every judgment has three parts; the ſubject, or notion about which the judgment is;

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preſſes the agreement of *things* rather than of *notions*. But the notions are controlled by the things, otherwiſe aſſent and diſſent would be arbitrary. I am *forced* to ſay "the day is fine," when the ſky is cloudleſs, becauſe my perceptions muſt correſpond with the facts. This correſpondence then the definition in the text is conſidered to imply, which is retained becauſe it is believed to be the only one that includes and deſcribes every kind of judgment. But the weight allowed to Mr. *Mill's* objection will depend on the theory of Perception we adopt, and that great metaphyſical queſtion we cannot here diſcuſs. See however *Reid.* Int. Powers, Eſſay VI. 3. *Hamilton's Reid.* Appendix C and D*. *Couſin,* Hiſtoire de la Phil. Leçon 24. Edinburgh Review, vol. LII. Art. "Reid and Brown."

the predicate, or notion with which the ſubject is compared; and the copula or nexus, which expreſſes the mode of connexion between them. The ſubject and predicate are called the terms of the judgment, i. e. the extremes or boundaries (*termini*) which it brings together.

§ 36. *Doctrine of Relation in Judgments.*

When we examine ſuch a judgment as "Man is a rational animal" (which, trite as it is, will ſerve for our preſent purpoſe) we find that the ſubject and predicate are exactly co-extenſive; in other words, no object comes into the claſs of rational animals which is not alſo in man, and converſely no object comes under man which is not alſo under rational animal. The two conceptions, the one ſymbolical, the other notative,* are generalized from the very ſame claſs of beings. This equality of ſubject and predicate is an important property of the judgment, for it conveys the power to ſubſtitute the one conception for the other, at pleaſure.

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* P. 47.

Other judgments want this property. To ſay that " trees are plants" is to ſay indeed that no object is a tree which is not alſo a plant ; but then there are plants which are not trees ; ſo that plant and tree are not conceptions of equal extent.

It is true that the copula—the " is" or " are" which couples the conceptions—does not expreſs the great difference we have noticed ; being uſed in common language for either relation of the two terms. But as the correctneſs of ſome trains of reaſoning depends entirely upon obſerving the relation of coincidence between ſubject and predicate, it is uſual to alter the copula in ſome way, to expreſs it, as by ſaying " Man *is defined to be* a rational animal." In the preſent book, inſtead of the copula " is" or " are," the mathematical ſign of equality (=) will be employed in every affirmative judgment in which the predicate is diſtributed, or taken entire.

Every affirmative judgment indeed may

be regarded as an *equation* of ſubject and predicate, as every negative is a deciſion that an equation cannot be eſtabliſhed. By "All men are mortal" I mean that all men *are equal* to ſome mortal creatures; and by "Some plants are poiſonous" I mean that a part of my conception of plants coincides with a part of the conception of poiſonous things.[*]

§ 37. *The Two Predicable-Claſſes.*

Logicians have always formed a claſſification of predicates according to the relation in which they ſtand to their reſpective ſubjects. We propoſe to give the ſimpleſt form to this ſcheme of Predicable-Claſſes, or claſſes of conceptions which can ſtand as predicates, taking Ariſtotle's doctrine as the baſis.

Every judgment, according to Ariſtotle, declares either a genus, or the property, or the definition, or an accident[†] (*γένος—ἴδιον—*

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[*] Sir William Hamilton.

[†] *Top.* A. ch. IV. Of the names which A. adopts for the claſſes, *γένος*, and perhaps *ὅρος*, ſeem to expreſs ra-

ὅρος—συμβεβηκός) of its ſubject. The difference, or that mark or marks by which the ſpecies is diſtinguiſhed from the reſt of its genus, does not occupy a diſtinct poſition in Ariſtotle's liſt, but is ſaid to belong naturally to genus (ὡς οὖσαν γενικήν).* The ſpecies may be regarded as compoſed, not of the marks of the genus and the difference, ſo well as of thoſe of two concurrent or communicant genera; for the difference is but a genus which from its overlapping part of another is uſed as a diſtinctive mark of that part which it overlaps. If (for an eaſy example) in analyſing our notion of "the red-flowering currant" (*Ribes ſanguineum*) we regard "currant" as the genus and "red-flowering" as the difference, we may alſo regard "red-flower-

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ther the extenſion, the others the intenſion; but he uſes them as having both powers. The common diviſion of Predicable-claſſes is that of *Porphyry*, into Genus, Difference, Species, Property, and Accident.

[*] Like the genus, the difference can be predicated of many things differing in ſpecies. But the genus is predicated ἐν τῷ τί ἐστι, the difference ἐν τῷ ποῖον τί. *Alex. Aphrod.* in Berlin Ed. of *Ariſt.* Top. A. ch. IV.

ing" as a wide genus, wider in fact than "currant," and therefore we may ſay that our notion of the plant is generated by the concurrence of two genera.*

This we ſuppoſe to be Ariſtotle's meaning in conſidering difference as having the nature of genus. But the immediate teſt which he applies to his four Predicable-claſſes is —Can each of them, without logical fault, change places with its ſubject? In other words, is each of them co-extenſive with its ſubject or not? The reſults of the teſt will be apparent from an account of each of the claſſes.

Definition† is a deſcription which manifeſts completely the nature of the thing defined.

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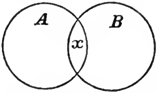
* Let A be the claſs of "red-flowering" things, B the claſs "currant;" then x, the part of each which is in the other, will be our notion of "red-flowering currant."



† Top. A. ch. v. More fully treated of in Top. Z. *paſſim*.

Such a deſcription would of courſe enable us to identify the ſubject, and to diſtinguiſh it from all other notions. And therefore it muſt be applicable only to the ſubject, otherwiſe it manifeſts, not the peculiar nature of the thing defined, but its *common* nature, the qualities which it ſhares with other things. As being applicable to the ſubject and to no other notion, it is co-extenſive with it, and therefore may change places with it in the judgment. It is juſt as true to ſay that "every rational animal is man" as that "every man is a rational animal." But if we ſaid that "man is a warm-blooded animal," or that "man is a civilized animal," neither of them would be a definition, nor could the predicate in either become the ſubject, without ſome limitation. The former is a deſcription that applies to more than man, the latter to a part only of man; and of courſe neither of them would enable us to apprehend exactly what man's nature was.

Property* is not eaſily diſtinguiſhed from definition. Indeed Ariſtotle confeſſes that property (ἴδιον) i. e. ſomething *peculiar* to the ſubject, and eſſentially its own, is a name which would naturally include definition, and would mean ſome attribute which belongs to all the ſubject and to it only ; but he adds the ſpecial limitation "without declaring the eſſence or nature of the ſubject." Every quality then which belongs to all the ſubject, and to no other, is a property, provided it be not uſed in the definition. It is co-extenſive with the ſubject, and can therefore change places with it in the judgment without logical fault. Thus "Man is capable of learning to write and ſpeak correctly" might become "every being capable of learning to write and ſpeak correctly is a man."

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* Top. A. ch. IV. and V.

But this ſubtle metaphyſical diſtinction between the definition and the property is as difficult to maintain as it is unneceſſary for the purpoſes of pure logic. How can we rely on being able to ſeparate our notion of the nature or eſſence of a thing from the properties which accompany that nature? Let it be the definition of man that he is "a rational animal" and the property, that he is "capable of ſpeaking correctly;" and how can we ſay that the latter is not in the eſſence, yet neceſſarily follows from the eſſence of man? It is *a part* of the eſſence, for "rational" implies it. In like manner, all the properties ſeem to be implicitly contained in every perfect definition. No criterion can be given for diſtinguiſhing between the eſſence and the inſeparable accompaniment of the eſſence; and a larger acquaintance with the nature of things makes it evident that what one ſcience regards as a property another muſt conſider as eſſential, and that there is no one paramount quality which is abſolutely eſſential and can never be degraded to the rank of a property.

The predicable genus is a claſs of which the ſubject is a contained part. It declares, though not completely, the nature of the ſubject. A ſubject may be included in many different genera by different ſets of marks; a man may be good, brave, rational, mortal, fallible, ſick, learned, and ſo on. But ſome of theſe qualities, as wholly ſeparable from the nature of man, are to be conſidered not as genera but as accidents. Genus, as being of the very nature of the ſubject, is inſeparable from it. As including the ſubject in common with other ſpecies, it is not co-extenſive with it. Hence the tranſpoſition of the ſubject and predicate in a judgment which predicates the genus, cannot take place; "all roſes are plants" cannot become "all plants are roſes."

Accident is a quality which belongs indeed to a ſubject, but can be taken away from it without deſtroying its nature or eſſence. We predicate accident when we ſay that "a man is ſpeaking." Accident cannot change places with its ſubject, becauſe it does not apply to the whole of that ſubject and to it alone. But a criterion is wanting to diſtinguiſh between accident and genus or ſpecies. It is an accident to the people of this country that they were born in it; becauſe we might conceive them to have been born elſewhere; but then it has modified their nature or eſſence, and we underſtand by Engliſhman not merely one who was born within the four ſeas, but a man of particular feelings, views and privileges, which are parts of his very nature. Here accident and genus or property ſeem to become confuſed. It is an accident too that this nail is ruſty and that guinea bright, but then it ſhows that the gold has a *property*—of reſiſting oxidation—which the iron wants, and might ſerve to place them in two diſtinct ſpecies of metals. Ariſtotle actually ſpeaks of man as an accident of the genus animal;[*] no doubt becauſe we might conceive that ſpecies annihilated without the deſtruction of the genus. It does not appear then that the predicable accident can at all times be diſtinguiſhed from the others, which would be a valid objection againſt retaining the doctrine in which it holds a place.

We propoſe to abandon, as at leaſt unneceſſary for logical purpoſes, the diſtinction between property and definition, genus and accident; and to form, as Ariſtotle has alſo done, two claſſes of predicables; one of predicables taken diſtributively, and capable of becoming ſubjects in their reſpective judgments, without limitation, the other of ſuch as have a different extenſion. In the former, the predicable has the ſame objects as its ſubject, but different marks or a different way of repreſenting the marks. In the latter there is a difference both in the marks and the objects. The former may be called Definition, or Subſtitute; the latter, Attribute.

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[*] Cat. VII. 14. In quoting the paſſage *Crackanthorp* ſays "Omnia inferiora accidentia ſunt reſpectu ſuorum ſuperiorum." See too Cat. VII. 13. Pacius: marginal note.

§ 38. *Definition explained.*

Every predicate which denotes exactly the ſame claſs of things as the ſubject, may be called a definition of the ſubject. Whether it unfolds the genus and difference, or the property, or only ſubſtitutes one ſymbolical conception for another, it is uſeful to *mark out* for us more clearly the limits of the ſubject defined, and is therefore capable of being employed as a definition for ſome thinker or other. Logicians have always allowed that in our definitions we are bound to conſider, not merely what is *abſolutely* the explanation of the ſubject, but what our hearers can adopt as an explanation. They would not allow that a definition which was conveyed in a metaphor, nor one of which the words were ſtrange or obſolete, was properly a definition, becauſe it would not be clear* to the hearer. They believed that there was an abſolute definition; but this was to be conveyed with due regard to the hearer's needs and attainments. Now one reaſon for enlarging the limits of definition, is that any of the predicates we propoſe to include, though not the *abſolute* definition, not the genus and difference, may be employed as a definition by ſome particular perſon, and may to him fulfil the purpoſe of the beſt logical definition which can be given; and therefore ought, if poſſible, to be comprehended under the ſame head. Thus, if I wiſh to define "honeſty," I may ſay that it is uprightneſs in tranſactions relating to property, that it is probity, that it is the beſt policy; and any one of theſe conceptions would enable ſome of my hearers to identify honeſty, even though that word had not before occurred in my ſpeech, or been ſuggeſted to their thoughts. If there were any one paramount conception, which would be to the minds of all a ſufficient definition of honeſty, I ſhould employ that, and place it in a claſs by itſelf. But this is not the caſe. To many a humble thinker, honeſty is the beſt policy would convey an idea, not adequate indeed but ſtill diſtinct,* when honeſty is uprightneſs in reſpect to tranſactions connected with property, would be but a ſtring of confuſed words. Let us then conſider definition as any conception which from having preciſely the ſame ſphere as another conception, may be uſed to aſcertain its nature and mark out its limits. And the judgment in which definition is predicated, we call a ſubſtitutive judgment, becauſe it furniſhes a predicate identical with the ſubject as to ſphere or extenſion, and therefore capable of being ſubſtituted for it.

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* Ariſtotle. Top. Z. (vi.) ch. II. *πᾶν γὰρ ἀσαφὲς τὸ κατὰ μεταφορὰν λεγόμενον . . . . . πᾶν γὰρ ἀσαφὲς τὸ μὴ εἰωθός.*

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* See p. 103.

The ſubject of a ſubſtitutive judgment is called alſo the definitum, or conception defined.

§ 39. *Sources of Definition.*

As the ſubject and predicate of every ſubſtitutive judgment are co-extenſive, they may change places in the judgment, ſo that the definitum may become in its turn a definition. We may define a conception, by exhibiting in our definition its extenſion, or by unfolding its intenſion, or by the ſubſtitution of one ſymbol for another, or one ſet of marks for another. It will be found from theſe principles that there are ſix ſources from which definitions may ariſe. i. From Reſolution,* when the marks of the definitum are made its definition; as in "a penſion is an allowance for paſt ſervices." It is not neceſſary that the marks ſhould be completely enumerated—that the conception ſhould be ſtrictly adequate—but only that the marks ſhould ſuffice for the identification of the ſubject, as belonging to it all and to it alone; ſo that Ariſtotle's Property would be included in it. ii. From Compoſition, the reverſe of the laſt method, in which the definitum, a conception of which the component marks are enumerated, ſtands ſubject to a definition implicitly containing thoſe marks; as, " thoſe who encroach upon the property of others are diſhoneſt." iii. From Diviſion, where we define the ſubject by enumerating its dividing members; as " Britons are thoſe who dwell in England, Scotland, or Wales." All the judgments called disjunctives are under this head. iv. From Colligation, the exact reverſe of the laſt; where the dividing members of a conception are enumerated in the ſubject, and the divided conception itſelf added to define them; as, hiſtorical, philoſophical, and mathematical ſciences are the ſum (i. e. *are all*, or *equal*) of human knowledge. This is the form which Inductive Judgments naturally aſſume. v. From change of Symbol, where both ſubject and predicate are ſymbolic conceptions, the latter being given as a ſubſtitute for the former on a principle of expedience only; as "probity is honeſty." This is the nominal definition of ſome logic-books. vi. From Caſual Subſtitution, where one repreſentation is put for another on a principle of expedience only, as ſerving to recal the marks, which both poſſeſs in common, more readily to the hearer's mind; as "the ſcience of politics is the beſt road to ſucceſs in life."

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* § 32.

TABLE OF DEFINITION.

A Conception is defined	By its Intenſion (or Marks)	being unfolded, =	i. Reſolution, or Definition proper.
		being re-united, =	ii. Compoſition.
	By its Extenſion (or Sphere)	being divided, =	iii. Diviſion.
		being re-united, =	iv. Colligation.
	By Accidental Coincidence	of a Symbol, =	v. Nominal Definition.
		of Notation, =	vi. Accidental Definition.

§ 40. *Attribute.*

A predicate, the exact limits of which are not determined, cannot be uſed to define and determine a ſubject. It may be called an attribute; and conveys, not the whole nature of the ſubject, but ſome one quality belonging to it. "Metals are heavy;" "Some ſnakes are venomous;" are judgments in which this kind of predicable occurs.

§ 41. *The Common diviſion of Judgments as to Relation.*

The relation in which the ſubject ſtands to the predicate in a judgment, whether as coincident or not-coincident with it, we call *the doctrine of Relation;* as to which we find that predicates are of two kinds, ſubſtitutes or definitions, and attributes. The common account of Relation, which we are bound to conſider, is ſomewhat different.

Judgments are divided, according to it, into three claſſes, the Categorical, the Hypothetical, and the Disjunctive Judgment.

The Categorical Judgment is one in which one conception is affirmed to belong or not to belong to another, as "Men are endowed with conſcience," "An enſlaved people cannot be happy."

The Hypothetical expreſſes ſeemingly a relation between two judgments, as cauſe and effect, as condition and conditioned; for example, "If the autumn is very dry, the turnip crop is ſcanty," "If the heart is right, ſo will the actions be."

The Disjunctive Judgment expreſſes the relation (apparently) of two or more judgments which cannot be true together, and one or other of which muſt be true; as "Either the Bible is falſe, or holineſs ought to be followed;" or the proverb—"A man is either a fool or a phyſician at forty."

Categorical Judgments are eaſily referred to the two claſſes, of ſubſtitutives and attributives, according as their predicates are or are not equal in extenſion to the ſubjects. This kind of judgment preſents little difficulty, after the explanations already given.

Perhaps our readers may be ſlow to admit that for all logical purpoſes the hypothetical judgment may be treated as a categorical. Yet this is the view to which we muſt adhere, in common with the beſt logicians. In the hypothetical, there are not two judgments but one. In the example "If the heart is right, the actions will be ſo," we neither ſay that any one's heart *is* right, nor that his actions will be; we do not paſs a judgment about either abſolutely, but we ſay that *if* the one is, *then* the other will be. So that what we really decide is that there is a connexion between the two facts; and the logical copula, though not expreſt there, has its proper place between the two clauſes, thus [" the caſe, fact, or notion, of the heart's being right] is [a caſe, fact, or notion of the actions being ſo."] But there are ſeveral kinds of hypothetical judgments, which have different properties.

The hypothetical judgment appears, as we have ſaid, as two judgments, the former of them, containing the condition, being called the antecedent, and the latter, containing the effect of the condition, being called the conſequent. In each of theſe there are two terms, which would give four in all, if one of the terms of the antecedent did not ſometimes re-appear in the conſequent, when the number of diſtinct terms is of courſe but three. Now only five arrangements of theſe terms are poſſible; in four of which there are but three terms, and in the fifth, four.

They are

1. If A is B, A is C
2. If A is B, B is C
3. If A is B, C is A
4. If A is B, C is B
5. If A is B, C is D.

The following are examples of theſe formulæ.

1. If one of the angles of a triangle is a right angle, it muſt be oppoſite to the greateſt ſide.
2. If this be poetry, poetry is worthleſs.
3. If brave men run away, you are brave.
4. If virtue is voluntary, vice is voluntary.
5. If the moon exerts her attractive force in the ſame line as the ſun, the tides are at the higheſt.

The obvious difference between the firſt four and the fifth example is, that the fifth alone expreſſes two ſeparate facts, brought together as cauſe and effect, whilſt in all the reſt, from the recurrence of a term in both clauſes, it is impoſſible to ſeparate entirely the two things ſtated. This leads to the obſervation of a real difference in their nature. Without attempting to examine the origin of our idea of cauſe and effect, we may ſtate, as a thing generally admitted, that all men are accuſtomed to regard ſome one fact as the neceſſary reſult of another, which they have obſerved invariably to precede or accompany it; and that they may learn, however different in nature the two facts may appear, to identify them ſo far as invariably to expect the effect where they have obſerved the cauſe. The drawing of a trigger is a very different fact from the ſudden death of a healthy man; yet every one knows that under certain circumſtances the one will infallibly cauſe the other. A given motion of the hands of an electric telegraph in London is a different fact from the ſailing of ſome ſhips of war from Portſmouth: yet the one will cauſe the other. The revolution of the moon has ſo little apparent connexion with the ſpring and neap tides, that it would be long before men obſerved what is really the caſe, that the poſition of the moon occaſions the tide's fluctuations. Experience obſerves that events happen together, or in a cloſe ſucceſſion, and the mind, after adequate obſervations, connects them by its idea of cauſe. Whether this idea be alſo a part of the experience, or one of the primitive conſtituents of the mind itſelf, even as the eye is a conſtituent part of the body, is a queſtion much debated; but it need not occupy us. We have to remark that two facts, which do not reſemble one another, between which perhaps we once ſaw no connexion, may be inſeparably linked together in our minds, as a cauſe and an effect. And when the connexion between them is ſtated, in a hypothetical (that is, a conditional) judgment, the truth of the ſtatement will entirely depend upon the correctneſs of our obſervation, ſince there can be nothing in the ſtatement itſelf to ſerve as a criterion of its truth. In "If A is B, C is D" we have no teſt but the application of our idea of cauſe and effect to the facts for which theſe letters ſtand. But in "If A is B, A is C," we appeal, not to the idea of cauſe, but to a categorical judgment of which we have the materials before us. "If A is B, A is C" will be true provided "All B is C" be true. "If this is an equilateral triangle, it is alſo an equiangular" muſt be tried by the rule "All equilateral triangles are equiangular." Here is no notion of cauſe; but a ſtatement of a rule, with the ſuppoſition that ſome one caſe comes under it. It really means, not that one event is cauſed by another, but that a conception has certain marks; which is the function of the categorical judgment.

All judgments apparently hypothetical, but having three terms only, may be reduced to categoricals by leaving out the term that is repeated, and uſing the other two for ſubject and predicate. Thus "If this be poetry, poetry is worthleſs" becomes "This (poetry) is worthleſs:" and "If virtue is voluntary, vice is voluntary," means that "Virtue, (in ſo far as pertains to the control of the will) is the ſame as vice." But as they have the conditional form, they may alſo be reduced to categoricals in the mode already deſcribed; —"The caſe of virtue being voluntary is a caſe of vice being voluntary." The conditional particle *if* means in judgments of this kind "if it ſhould prove that—or, be granted that," ſince the facts exiſt already, and the ſuppoſition refers to our knowledge of them. But in the true conditional the "if" ſignifies "if it occurs that," ſince the fact muſt come about, to neceſſitate the occurrence of another fact.

But whilſt conditional judgments differ eſſentially from categoricals, the former affirming the cauſal connexion between two diſtinct facts, and the latter declaring that a thing or claſs of things has ſome property; there is alſo a ſufficient ſimilarity to admit of their being identified, for logical purpoſes. Both alike affirm the invariable connexion of their two terms. By "All the tiſſues of the body continually decay and are reproduced," is meant that wherever one of the tiſſues of the human body exiſts, decay and reproduction are going on, and cannot be abſent: and in like manner, by "If the moon's attraction acts againſt that of the ſun, the tides are low" is meant that whenever theſe two heavenly bodies are found in the ſuppoſed poſition, we find a particular ſtate of the tides. In both caſes, one thing is affirmed to be an accompaniment of another. In the categorical, a thing has the mark expreſt by the predicate; and in the conditional, a fact has another fact for its mark. In the example given of the former kind of judgment, we affirm that without the notion of decay and reproduction, our notion of the tiſſues of the body would be wrong and incomplete: in the other example, that our notion of that poſition of the heavenly bodies would be incomplete, if we did not take into view its influence on the tides. Logic, willing to ſimplify her formulæ, and to leave the examination of the idea of cauſe and effect to Metaphyſics, reduces the conditional to the ſame rules as the categorical. The formula "The caſe, fact, or notion, of *this* exiſting, is, a caſe, fact, or notion of *that* exiſting" is ſufficient for the reduction of *any* conditional to a categorical. For true conditionals, i. e. thoſe where the ſuppoſition relates to the occurrence of facts, not to our knowledge of facts, we ſhall generally ſay "The *fact* of his being" &c.; for the other kinds, "The *notion*" &c. But ſome variations are admiſſible. Thus, recurring to our examples we may ſay,

1. The caſe of one angle of a triangle being a rectangle—is—a caſe of its being oppoſite to the greateſt ſide.
2. The admiſſion that this is poetry—would be an admiſſion that poetry is worthleſs.
3. The notion that all brave men run away—is—a notion of your being brave.
4. The notion that virtue is voluntary—implies—the notion that vice is voluntary.
5. The fact that the moon exerts her attractive force in the ſame line as the ſun—implies—the fact that the tides are at the higheſt.

But let it be noticed that the four firſt examples contain the materials not ſo much of a judgment, as of a perfect argument, of which one of the judgments is *ſuppoſed* to be true.

1. Every right angle of a triangle is oppoſite the greateſt ſide.

This angle is a right angle,
Therefore it is oppoſite to the greateſt ſide.

2. This poetry is worthleſs.
This poetry is *all* poetry (i. e. is a fair ſample of every kind),
Therefore all poetry is worthleſs.

3. Brave men are *all* thoſe who run away.
You run away,
Therefore you are brave.

4. Virtue is voluntary.
Vice (as far as the will goes) is the ſame as virtue,
Therefore vice is voluntary.

Conditionals may appear either as ſubſtitutive or attributive judgments. If they ſet forth ſome cauſe which not only produces a given effect, but is the only cauſe that does ſo, they belong to the former claſs. "If the moon comes between the ſun and the earth, the ſun will be eclipſed"—is a judgment of this kind, for there is no other cauſe which produces that effect: and therefore we may either ſay "All caſes of the moon's coming between the ſun and the earth—are—caſes of the ſun's being eclipſed," or the ſimple converſe "All caſes of the ſun's being eclipſed—are—caſes of the moon's coming between the ſun and the earth." But where the cauſe ſtated is only one of ſeveral which might have produced the effect,—as in "If it rains, the flower beds will be wet," where the ſame effect would be produced by the falling of dew, or the uſe of the watering-pot,—we cannot employ the ſimple converſe, for the predicate is wider than the ſubject. We may ſay "All caſes of its having rained, are caſes of the flower-beds being wet," but obviouſly not "All caſes of the flower-beds being wet are caſes of its having rained." Theſe are attributives.

Disjunctive judgments may all be referred to the head of ſubſtitutives; for the ſphere of the predicate is juſt equal to that of the ſubject, the latter being a conception, and the former the ſame conception logically divided.* In "Either Shakſpeare is wrong, or Richard III. was a monſter," our meaning may be expreſſed thus—"The poſſible caſes in this matter are that Shakſpeare is wrong, and that Richard III. was a monſter;" which is a ſubſtitutive judgment. The real premiſs in a disjunctive *argument* is not the disjunctive judgment itſelf, but, as will be ſhown, a certain immediate conſequence from it.

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* See § 31.

§ 42. *Doctrine of Quantity, or of the Extenſion of the ſubject in a judgment.*

A judgment is either about the whole of a conception, as "all ſtars ſhine;" and this we call a univerſal judgment: or about part of a conception, as "Some lakes have an outlet," and this is a particular judgment; or about an intuition, as "Northumberland Houſe is near Charing Croſs," and this is a ſingular judgment.

For logical purpoſes we may regard all ſingulars as univerſals, becauſe they agree in bringing in the whole, and not a part, of their ſubject. So that as to Quantity, judgments are either univerſal or particular.*

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* See *Wallis'* Logic. *Theſis* 1. Further diſtinctions of judgments as to Quantity have been brought in by the acuteneſs of logicians, which for philoſophical purpoſes are not very important. The judgment—"Moſt men are prejudiced" cannot, it is argued, be conſidered

§ 43. *Doctrine of Quality, or the agreement or diſagreement of ſubject and predicate.*

Where a judgment expreſſes that its two terms agree, it is called Affirmative; as, All planets move in an elliptic orbit; where it expreſſes their diſagreement, it is termed negative; as, No human knowledge is perfect. This part of the judgment is its Quality. Although the negative particle is not always connected with the copula, but may appear in other parts of the ſentence, in every real negative judgment it belongs only to the

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as particular, for it implies not only that *ſome* men, but *more than the half* of mankind are prejudiced. Theſe are termed *plurative* judgments; and will be mentioned again in examining the ſyllogiſm. To Profeſſor *De Morgan* belongs the merit of recalling attention to them; and in his elaborate and acute "Formal Logic," p. 325, he inſerts Sir *W. Hamilton's* remark upon the uſe of them, that "all that is out of claſſification—all that has no reference to genus and ſpecies, is out of Logic, indeed out of Philoſophy;" that Philoſophy ſeeks to know whether *all* or *ſome* or *more* of a ſubject comes into a predicate, but not whether much or little, for "Philoſophy tends always to the univerſal and neceſſary," to which this diſtinction does not ſeem to belong. At the ſame copula. The two terms are given, and the queſtion always is whether *is* or *is-not* ſhall be the connecting link between them.

But by removing the negative ſign from the copula, and attaching it to the predicate, we may turn the judgment into an affirmative of a peculiar kind, ſometimes called an indefinite,* which is equivalent in ſignification to the negative. Inſtead of, No human knowledge is perfect, we may ſay with equal truth, All human knowledge is *non*-perfect, or *im*perfect. This licence is founded on the law† that it amounts to the ſame thing

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time the plurative judgment deſerves attention, as being a poſſible mode, and as bringing in a curious exception to a rule of ſyllogiſm.

In the ſame work (p. 142), another claſs of propoſitions is mentioned, called the "numerically definite propoſition," where the number of objects both of the ſubject and predicate is known and ſpecified. The ſame objection and defence would apply to them as to the plurative judgments; only that their practical uſe ſeems even leſs, and it is difficult even to invent an example likely to occur.

* By Wolff, *Phil. Rat.* § 209, and Kant, *Logik* § 22.

† Compare § 30.

whether we ſay that our ſubject is ſhut out from ſome poſitive conception or included in the cognate privative, for any given ſubject whatever muſt be found in one of the two. But in their uſe in logic theſe indefinite judgments may, without inconvenience, be conſidered as affirmatives.

To diſtinguiſh between negative judgments and ſuch as are ſo only in appearance, we muſt conſider whether the ſign of negation, *not*, is meant to affect the copula, or whether it really belongs to one of the terms. In, "Not to ſubmit would be madneſs," there is no negation, though the ſign of it is expreſſed.

§ 44. *Doctrine of Modality.*

The degree of certainty with which a judgment is made and maintained, is called its modality; as being the *mode*, or meaſure, in which we hold it to be true. We affirm with very different degrees of aſſurance, the two judgments, that "An equilateral triangle is equiangular" and that "Zeno of Elea was the inventor of dialectic;" ſince we can prove the former to demonſtration, whilſt doubts may be entertained as to the evidence on which the latter reſts. Opinions differ as to the place which this doctrine ought to hold in Logic. Not without heſitation, it is here excluded from pure, to be diſcuſſed in applied Logic, on the ground that the modality of a judgment is not part of itſelf, and does not belong to the copula,—as ſeems to be ſhown by the fact that the degree of certainty about the ſame judgment fluctuates in the mind of the ſame perſon at different times, and, ſtill more, in different perſons, the mode of expreſſion remaining unaltered.*

§ 45. *Diſtribution of Terms in Judgments.*

Univerſal judgments diſtribute, *i.e.* introduce the whole of, their ſubject; particulars do not. In " All the fixed ſtars twinkle" and " No man is wiſe at all times," it is obvious that we are ſpeaking of the whole of the fixed ſtars, and of men, reſpectively; and therefore each term is diſtributed.

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* *Kant* takes the oppoſite view. Critick. p. 75. Eng. Tranſ. Ed. I.

Negative judgments diſtribute the predicate. If " No minerals are nutritious for animals" is aſſerted, it means that nothing which is nutritious for animals can have the properties of minerals; and ſo the term " nutritious for animals" is diſtributed; and if we ſuppoſe that only *ſome* nutritious things are aſſerted not to agree with minerals, it would follow that *ſome other* nutritious things might agree with, i. e. might be, minerals, ſo that we might ſay at the ſame time— " No minerals are nutritious for animals" and " Some minerals are nutritious for animals;" whereas we know that we meant by the former judgment to exclude the poſſibility of our receiving the latter. If the predicate of a negative is not diſtributed, then it can have no real negative power; for if the ſubject is only excluded from one part of the predicate, it may be included in ſome other part.

Subſtitutive judgments diſtribute the predicate. Since the predicate in them is uſed to define the ſubject, it muſt itſelf be definite, and therefore the whole of it muſt be given, otherwiſe the uncertainty as to what *part* was meant, would make it uſeleſs for definition.

We may here remark that an ambiguity attaches to ſome particles which have important duties in Logic. The copula *is* means always *exiſts*,* but when uſed in a propoſition, it expreſſes an exiſtence modified or limited by the predicate; when employed alone, it expreſſes *abſolute* exiſtence, *i. e.* that the ſubject is among the claſs of really exiſting things. Upon this variation a well-known fallacy† was founded; that of arguing that becauſe " Ptolemy is dead" (*i. e.* only exiſts to us in the way that a dead perſon can, by a remembered or traditionary notion) therefore " Ptolemy *is*" (*i. e.* has an actual exiſtence among other living perſons,) which is a very different ſtatement.

Again the word *all* in its proper logical ſenſe means " each and every;" but it ſtands ſometimes for "all taken together." "All theſe claims upon my time overpower me." Hence may ariſe an ambiguity; inſtead of the *all* in its logical uſe, we may put *every;* but to exerciſe the ſame liberty with the other ſenſe of it would be abſurd. The example given could not mean "Every ſingle claim upon my time overpowers me."

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* See however *Waitz*, on Organ. 16, a. 12, for the ſenſe of the copula in Ariſtotle.

† *Ariſtotle*, de Soph. Elench. ch. v. iii. Tauchnitz.

The word *ſome* is likewiſe the cauſe of confuſion, in its logical uſe. In what ſenſe is the "ſome" of a particular propoſition to be underſtood? Does it mean "Some, we know not how many," or "A certain number, which we have in our thoughts"? Suppoſe that hiſtorical reading leads to the conviction that "Some democratic governments have ended in a tyranny," it may be doubtful whether this reſult includes preciſely thoſe democracies which we have found in our reſearches were conſummated by deſpotiſm, and no others, in which caſe the conception in our minds is definite and preciſe, though conveyed in an indefinite expreſſion: or only expreſſes that this has occaſionally happened to democracies, poſſibly to others beſides thoſe which we have ſtudied, in which caſe the conception "ſome democracies" would be purely indefinite. The word appears to be employed in the two ſenſes of "Some or other," and "Some certain," in common language; and it becomes a queſtion in which ſenſe it is to be regarded in Logic.

Now the different ſteps in attaining knowledge are marked by the acquirement of new laws or rules, that is to ſay, of univerſal judgments, expreſſing that to the whole of a given claſs of things or facts, ſome mark or property belongs. And wherever a definite number of things is aſcertained to poſſeſs a mark, it is the tendency of the mind to ſet them apart from other things that moſt reſemble them, by ſome name, which may ſtand for them both in thought and ſpeech, for the ſake of making the ſtatement univerſal. If by "Some democracies have ended in deſpotiſm," we mean ſimply to aſſert that in three or four countries, with the hiſtory of which we are familiar, and which we could name, this reſult has occurred, the ſtatement is really univerſal, only that our ſubject is a ſpecies only of the genus "democracies;" and we ought to ſay "The democracies (three or four) whoſe hiſtory we have traced." But as our having ſtudied them is not of importance enough to found a diſtinction upon, a univerſal aſſertion of this kind would have no philoſophical value; and by "Some democracies end in deſpotiſm" we ſhould mean to declare that in trying to find the agreement between theſe two terms, we had not ſucceeded in eſtabliſhing the rule, the univerſal judgment, but that a partial agreement had appeared, the extent of which, though it was diſcovered from ſome particular caſes, was not, ſo far as we knew, limited to them, but remained thoroughly indefinite. Every term then which, though indefinitely expreſſed, refers to a definite claſs of things, ſhould be rendered definite. Wherever the things denoted by the ſubject are really definite, as having ſome marks that group them in a ſmaller claſs by themſelves, ſcience requires that inſtead of appearing as part of the larger, they ſhould have their own name and poſition.

SUMMARY OF THE ANALYSIS OF JUDGMENTS.

The Nature or Form of Judgments conſiſts in their having a certain

- Quantity — as to which they are either
  - Univerſal—where the whole ſubject is joined to the predicate.
  - or Particular—where part of the ſubject is joined to the predicate.
- Quality — as to which they are either
  - Affirmative—where the predicate is decided to agree with the ſubject.
  - or Negative—where the predicate is decided not to agree with the ſubject.
- Relation — as to which, *affirmative* judgments are either
  - Attributive—where an indefinite (i. e. undiſtributed) predicate is aſſigned to the ſubject.
  - or Subſtitutive—where a definite (i. e. diſtributed) predicate is aſſigned to the ſubject, which may be ſubſtituted for it, and ſerve as its definition.

§ 46. *Table of all the Judgments.*

The following table contains examples of the ſix kinds of judgments, with their Quantity, Quality and Relation expreſſed, and the vowels which may conveniently be uſed as ſymbols of them.

EXAMPLE.	QUANTITY.	QUALITY.	RELATION.	SIGN.
All the ſalts are ſoluble.	Univerſal	Affirmative	Attributive.	A.
No right action is inexpedient.	Univerſal	Negative		E.
Some muſcles act without our volition.	Particular	Affirmative	Attributive.	I.
Some plants do not grow in the tropics.	Particular	Negative		O.
Common ſalt is chloride of ſodium.	Univerſal	Affirmative	Subſtitutive.	U.
Some ſtars are all the planets.	Particular	Affirmative	Subſtitutive.	Y.

An inſpection of the table will ſhew that of the ſix judgments there are three of univerſal and three of particular quantity; that there are four of affirmative and two of negative quality; that there are two of attributive and two of ſubſtitutive relation, whilſt the two negatives, as denying that either relation ſubſiſts between the ſubject and predicate, are undetermined as to relation. The vowels in the laſt column are very uſeful in abbreviating the proceſſes of Logic; for inſtead of ſaying that a given judgment is a univerſal affirmative judgment, it is ſufficient to ſay that it is an A, which conveys to one converſant with Logic, the ſame meaning. The laſt example, of Y, is given in the words beſt adapted to ſhew the diſtribution of its terms; but in practice it would probably occur as "Stars *include* the planets," which has preciſely the ſame import. But this form of judgment is ſeldom uſed* becauſe, the ſubject being the principal notion in every judgment, it is unnatural to put an indefinite (i. e. undiſtributed) conception in the principal place, and a definite (i. e. diſtributed) conception in the place of ſecond importance. That notion of which we had the whole before us, would naturally occur firſt; and this, it ſeems, is the pſychological principle in which "All planets are ſtars" is a more obvious and natural judgment than its converſe "Some ſtars are all planets." Nor is the predicate of Y ſtrictly definitive, ſince it only ſerves that purpoſe for *a part* of the ſubject.

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* The old logicians would have called it, probably, an "*inordinata propoſitio*," or unnatural propoſition. *Keckermanni* Log. B. II. § i. cap. 1, not quite upon the ſame grounds. Comp. *Ariſt.* An. Poſt 1, xxii. 3; and *Zabarella* upon it, p. 909.

§ 47. *Table of Judgments according to Sir W. Hamilton.*

To the ſix judgments juſt given, a very diſtinguiſhed logician adds two. Extending the doctrine of diſtribution, he ſays that in negative judgments, as well as in affirmative, we may ſpeak of—the whole of both terms—part of both terms—the whole of the ſubject and part of the predicate—part of the ſubject and the whole of the predicate; ſo that there are four kinds of affirmatives and four of negatives. Putting X and Y to ſtand for any ſubject and predicate, we may exhibit them thus:—

Sign.	Affirmatives.	Negatives.	Sign.
U.	All X is all Y	No X is Y.	E.
I.	Some X is ſome Y	Some X is not ſome Y.	ω.
A.	All X is ſome Y	No X is ſome Y.	η.
Y.	Some X is all Y	Some X is no Y.	O.

On comparing this table with that given in the laſt ſection, it will be found that with the exception of the two negatives marked η and ω, each judgment here has a counterpart there. Why have we ventured, in accordance with the practice, it is believed, of all logicians, to exclude theſe two?

The anſwer is, that whilſt Sir William Hamilton gives a table of all *conceivable* caſes of negative predication, other logicians have only admitted *actual* caſes. It is not inconceivable that a man ſhould ſay "No birds are *ſome* animals," (the η of the Table) and yet ſuch a judgment is never actually made, becauſe it has the ſemblance only, and not the power, of a denial. True though it is, it does not prevent our making another judgment of the affirmative kind, from the ſame terms; and "All birds are animals" is alſo true. Though ſuch a negative judgment is conceivable, it is uſeleſs; and feeling this, men in their daily converſation, as well as logicians in their treatiſes, have proſcribed it.—But the fruitleſſneſs of a negative judgment where both terms are particular is even more manifeſt; for "Some X is not ſome Y" is true, whatever terms X and Y ſtand for,* and therefore the judgment, as preſuppoſed in every caſe, is not worth the trouble of forming in any particular one. Thus if I define the compoſition of common ſalt by ſaying "Common ſalt is chloride of ſodium," I cannot prevent another ſaying that "*Some* common ſalt is not *ſome* chloride of ſodium," becauſe he may mean that the common ſalt in *this* ſalt-cellar is not the chloride of ſodium in *that*. A judgment of this kind is ſpurious upon two grounds; it denies nothing, becauſe it does not prevent any of the modes of affirmation; it decides nothing, inaſmuch as its truth is preſuppoſed with reference to any pair of conceptions whatever. In a liſt of *conceivable* modes of predication, theſe two are entitled to a place.

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* Except of courſe they repreſent individuals; and all that could be inferred from ſuch a judgment would be that its terms were general, not individual—conceptions not intuitions. Even this however is provided for, as we know from their being particular, that they muſt be capable of diviſion, and therefore general. "Some Nicias" could only be ſaid with propriety, if there were ſeveral men bearing that name.

§ 48. *Import of Judgments. Extenſion and Intenſion. Naming.*

Upon the examination of any judgment which appears to expreſs a ſimple relation between two terms, we ſhall find it really complex, and capable of more than one interpretation. "All ſtones are hard"—means in the firſt place that the mark, hardneſs, is found among the marks or attributes of all ſtones; and in this ſenſe of the judgment, the predicate may be ſaid to be contained in the ſubject, for a complete notion of ſtones contains the notion of hardneſs and ſomething more. This is to read the judgment as to the intenſion (or comprehenſion) of its terms.*

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* See p. 127.

Where it is a mere judgment of explanation, it will mean "the marks of the predicate are among *what I know to be* among the marks of the ſubject:" but where it is the expreſſion of a new ſtep in our inveſtigation, of an acceſſion of knowledge, it muſt mean "the marks of the predicate are among *what I now find* to be the marks of the ſubject."*

Both ſubject and predicate however not only imply certain marks, but repreſent certain ſets of objects. When we think of "all ſtones," we bring before us not only the ſet of marks—as hardneſs, ſolidity, inorganic ſtructure, and certain general forms—by which we know a thing to be what we call a ſtone, but alſo the claſs of things which have the marks, the ſtones themſelves. And we might interpret the judgment "All ſtones are hard" to mean that "The claſs of ſtones is contained in the claſs of hard things." This brings in only the extenſion of the two terms; according to which, in the example before us, the ſubject is ſaid to be contained in the predicate. Every judgment may be interpreted from either point of view; and a right underſtanding of this doctrine is of great importance. Let it be noticed, againſt a miſtake which has been re-introduced into logic, that all conceptions, being *general*, repreſent a claſs, and that to ſpeak of a "general name" which is not the name of a claſs, is a contradiction in terms. But this is very different from aſſerting that a claſs of things correſponding to the conception actually exiſts in the world without us. The conceptions of giant, centaur and ſiren are all of claſſes; but every one knows, who realizes them, that the only region in which the claſſes really exiſt, is that of poetry and fiction. The mode of exiſtence of the things which a conception denotes is a mark of the conception itſelf; and would be expreſſed in any adequate definition of it. It would be inſufficient to define "Centaurs" as a ſet of monſters, half-men and half-horſes, who fought with the Lapithæ, ſo long as we left it doubtful whether they *actually* lived and fought, or only were feigned to have done ſo; and by ſome phraſe, ſuch as "according to Ovid" or "in the Mythology" we ſhould probably expreſs that their actual exiſtence was not part of our conception of them.

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* See next §.

The judgment ſelected as our example contains yet a third ſtatement. We obſerve marks; by them we ſet apart a claſs; and laſtly we give the claſs or name a ſymbol, to ſave the trouble of reviewing all the marks every time we would recall the conception.* "All ſtones are hard" means that the name hard may be given to every thing to which we apply the name ſtones.

All judgments then may be interpreted according to their Intenſion, their Extenſion, and their application of names or deſcriptions; as the following examples may help to ſhow.

A. "All the metals are conductors of electricity" means

Intenſion. The attribute of conducting electricity belongs to all metals.

Extenſion. The metals are in the claſs of conductors of electricity.

Nomenclature. The name of conductors of electricity may be applied to the metals (among other things). †

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* P. 47.

† "Among other things." This qualification is re-

E. "None of the planets move in a circle" means
Intenſion. The attribute of moving in a circle does not belong to any planet.
Extenſion. None of the planets are in the claſs (be it real, or only conceivable) of things that move in a circle.
Nomenclature. The deſcription of things that move in a circle cannot be applied to the planets.

I. "Some metals are highly ductile" means
Intenſion. The mark of great ductility is a mark of ſome metals.
Extenſion. Some metals are in the claſs of highly ductile things.
Nomenclature. The name of highly ductile things may be applied to ſome metals.

O. "Some lawful actions are not expedient" means
Intenſion. The attribute of expediency does not belong to ſome lawful actions.
Extenſion. Some lawful actions do not come into the claſs of expedient things.
Nomenclature. The name of expedient cannot be given to ſome lawful actions.

U. "Rhetoric is the art of perſuaſive ſpeaking" means
Intenſion. The attributes of the art of perſuaſive ſpeaking, and of Rhetoric, are the ſame.
Extenſion. Rhetoric is co-extenſive with the art of ſpeaking perſuaſively.

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quired by the rules of diſtribution, for metals are only *ſome* conductors.

Nomenclature. "The art of perſuaſive ſpeaking" is an expreſſion which may be ſubſtituted for Rhetoric.

Y. "The claſs of animals includes the polyps" means
  Intenſion. The attributes of all the polyps belong to ſome animals.
  Extenſion. The polyps are in the claſs of animals.
  Nomenclature. The name of polyps belongs to ſome animals.

§ 49. *Analytic and Synthetic Judgments.*

Some judgments* are merely explanatory of their ſubject, having for their predicate a conception which it fairly implies, to all who know and can define its nature. They are called analytic judgments, becauſe they *unfold* the meaning of the ſubject, without determining anything new concerning it. Though they cannot be ſaid to augment our knowledge of the ſubject, the habit of thinking of things without realizing all their marks, is ſo common, that judgments in which the marks are predicated anew are uſeful to revive our remembrance of them; whilſt they are indiſpenſable in explaining to others the nature of our ſubject, of which they may not have an adequate notion. If we ſay that "all triangles have three ſides," the judgment is analytic; becauſe "having three ſides" is always implied in a right notion of a triangle. Such judgments, as declaring the nature or eſſence of the ſubject, have been called "eſſential propoſitions."*

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* *Kant*. Logik. § 36, and Prolegomena, § 2.

Judgments of another claſs attribute to the ſubject ſomething not directly implied in it, and thus increaſe our knowledge. They are called ſynthetic, from *placing together* two notions not hitherto aſſociated. For example—"All bodies poſſeſs power of attraction" is a ſynthetic judgment; becauſe we can think of bodies without thinking of attraction as one of their immediate primary attributes. But if our knowledge of any object were complete, we ſhould conceive it inveſted with *all* its attributes, and no ſynthetic judgments would be required.

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* *Mill's* Logic. B. I. ch. vi. It is however a miſnomer to call them all "identical propoſitions." "Every man is a living creature" would not be an identical propoſition unleſs "living creature" denoted the ſame as "man;" whereas it is far more extenſive. *Locke* underſtands by identical propoſitions only ſuch as are tautologous—"by identical propoſitions I mean only ſuch wherein the ſame term, importing the ſame idea, is affirmed of itſelf." (Hum. Under. IV. viii. 3.) But he condemns the uſe of what we have called analytic judgments likewiſe, (Hum. Under. IV. viii. 4.) as adding nothing to real knowledge: he would probably admit them as *explanatory* propoſitions.

We muſt diſtinguiſh between analytic and tautologous judgments. Whilſt the analytic diſplay the meaning of the ſubject, and put the ſame *matter* in a new *form*, the tautologous only repeat the ſubject, and give us the ſame matter in the ſame form, as "Whatever is, is." "A ſpirit is a ſpirit." Whether in thinking or in teaching, the tautologous judgments are uſeleſs.*

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* *Kant.* Logik. § 37. *Locke.* Hum. Under. IV. viii. 2.—They may accidentally, and by a particular emphaſis, become the vehicles of emotion or rebuke. The "Senſation is ſenſation" of Dr. Johnſon means "One cannot help feeling." So too the obvious analytic judgments, "A negro has a ſoul, pleaſe your honour," of *Sterne's* Corporal, and "He has no wife" of the agonized Macduff, convey a pathos from their accidental uſe, and from the train of judgments they ſuggeſt, but diſdain to expreſs, which their mere logical import does not account for.

OUTLINE OF THE LAWS OF THOUGHT.

PART III.

SYLLOGISM. REASONING.

Ὁ μὲν γὰρ συλλογισμὸς ἐκ τινῶν ἐστὶ τεθέντων, ὥστε λέγειν ἕτερόν τι ἐξ ἀνάγκης τῶν κειμένων διὰ τῶν κειμένων.

Aristotle.

SYLLOGISM. REASONING.

§ 50. *Syllogiſm.*

WHEN the ſtate of our knowledge does not warrant us in judging at once whether two conceptions agree or differ, we ſeek for ſome other judgment or judgments, that contains the grounds for our coming to a deciſion. This is called reaſoning, which may be defined "the proceſs of deriving one judgment from another." The technical name for that one ſingle ſtep of the proceſs, of which the longeſt chains of reaſoning are but the repetition, is ſyllogiſm, or "computation," a word which has probably come to be employed in its preſent ſenſe from the reſemblance between computation proper, i. e. gathering the reſults of a ſum, and that gathering of the reſult of other judgments that we call reaſoning. A ſyllogiſm has been defined "A ſentence or thought in which, from ſomething laid down and admitted, ſomething diſtinct from what we have laid down follows of neceſſity."* The form or eſſence of a ſyllogiſm therefore conſiſts, not in the truth of the judgments laid down or of that which is arrived at, but in the production of a new and diſtinct judgment, not a mere repetition of the antecedents, the truth of which cannot be denied without impugning thoſe we have already accepted for true.

The new judgment which is to be drawn, and which gives occaſion for the reaſoning proceſs, is called, *before* proof is found, the queſtion or problem, and *after* proof the concluſion. The judgments uſed to eſtabliſh the concluſion are termed the premiſſes; and the connexion between the premiſſes and concluſion, that entitles us to gather the one from the other, is the conſequence; as appears from the phraſes "by conſequence," "conſequently," ſo often employed in argument. Sometimes the concluſion, as following "by conſequence" has itſelf the name of conſequence, although conſequent would be more ſtrictly correct. Latin writers have applied the names *complexio* and *connexio* to the ſame part of the ſyllogiſm.

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* *Ariſtotle*, Pri. An. I. i. I ſay "a ſentence or thought" becauſe λόγος means both *ratio* and *oratio*. The words "laid down and admitted" have no excluſive reference to diſputation, for we may lay down judgments for *our own* uſe alone, when there is no diſputant in the caſe. *Trendelenburg* and *Waitz*, on this paſſage.

§ 51. *Immediate and Mediate Inference.*

In ſome caſes we are unable to decide that the terms of the queſtion agree with or differ from one another, without finding a third, called the *middle*, term, with which each of the others may be compared in turn. This is mediate inference. If one ſuſpects that "this liquid is poiſon," it may be impoſſible to convert the ſuſpicion into certainty, until one has found that "it contains arſenic;" "containing arſenic" will then be the middle term, which will be compared in a judgment with each of the others in turn; and the whole argument will run "This liquid contains arſenic; and every thing that contains arſenic is poiſonous; conſequently this liquid is." We will ſay nothing at preſent of the means of finding middle terms, although, as in the given example, long trains of thought or patient obſervation may be required to ſecure them.

But ſometimes, inſtead of a third term, differing entirely from the other two, the premiſs only need contain the two terms of the concluſion, or ſome modification of them. Thus from "All good rulers are juſt" we infer that "No unjuſt rulers can be good," a judgment introducing indeed no new *matter*, *i. e.* making us acquainted with no new facts; but ſtill diſtinct from that from which we drew it, as repreſenting the matter under a new form. Here, for purpoſes of inference, there are not three different terms, becauſe *juſt* and *unjuſt*, though they ſtand for two ſeparate ſets of objects, have a particular relation, each implying the exiſtence of the other.* Some logicians refuſe the name of inference to this and ſimilar proceſſes, on the ground that "there is in the concluſion no new truth, nothing but what was already aſſerted in the premiſſes, and obvious to whoever apprehends them."† That the concluſion is *virtually* aſſerted in the premiſſes, is true not only of theſe immediate inferences, but of all ſyllogiſms whatever; even in the inductive, the mere conſequence—the act of concluding—brings in nothing which is not known potentially as ſoon as we have the whole grounds before us. So that the objection proves too much; as it would diſqualify a ſet of inferences which no one thinks of rejecting. If however there is abſolutely nothing new—if the conceſſion of the premiſs is not only a virtual, but an actual and expreſs declaration of the concluſion, there is no inference, but mere repetition. But who can ſay that "No unjuſt rulers are good" is a bare repetition of "All good rulers are juſt ?" In the one we affirm, in the other deny; in the one the ſubject of thought is "good rulers," in the other "unjuſt rulers." They are, in theſe two points at leaſt, diſtinct judgments, and as the paſſing of the one makes it poſſible without further obſervation or deciſion upon facts, to collect the other, there is an inference. In many ſuch caſes, it is true, the inference is ſo obvious, ſo certain to occur upon the firſt glance at the premiſs, that it ſeems needleſs to draw it out; but all the inferences we are about to ſpecify are uſed from time to time, and this entitles them to our conſideration.

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* See § 30. † *Mill's* Logic, B. II. ch. 1, § 2.

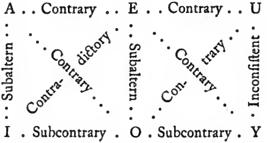
The ſame objection would lie againſt all attempts to give rules for the immediate inferences, as would be brought againſt a definition of the colour *blue*, or ſcientific directions for walking; namely, that the things themſelves are ſo ſimple that we underſtand them perfectly without directions. It is eaſier to diſcover for ourſelves the principle of any caſe that may ariſe, than to charge the memory with a liſt of all the caſes and their laws; and therefore few ſtudents will go beyond the ſimple examination of the following ſections, which are neceſſary for the completeneſs of our analyſis of thinking.

§ 52. *Oppoſition and Inferences depending on it.*

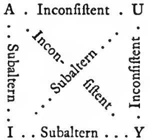
Oppoſition of judgments is the relation between any two which have the ſame matter, but a different form, the ſame ſubject and predicate, but a different quantity, quality, or relation. Between "No form of government is exempt from change," and "Some forms of government are exempt from change," there is an oppoſition, called by logicians contradictory, the rule of which is that one or other of the judgments muſt be true, that no intermediate one is poſſible, and that both cannot be true together. Hence it reſults, that if I lay down that "No A is B," I imply the impoſſibility of laying down "Some A is B," or in technical phraſeology, if I poſit the one I remove the other. And again, the refuſal to adopt "No A is B," is equivalent to laying down that "Some A is B;" the removal of one implies the poſition of the other. The doctrine of oppoſition has to ſhow what may be inferred as to the truth or falſehood of any other kind of judgment, from the truth or falſehood of a given one, the ſubject and predicate remaining always the ſame. Arbitrary names, ſanctioned by the earlieſt uſage, have been given to the relation between each pair of judgments, to which ſome addition has been rendered neceſſary by the new judgments *U* and Y. But the terms choſen are ſuch as convey their own meaning; and where it was poſſible, the well-known names have been extended to new relations, inſtead of introducing new ones.

TABLES OF OPPOSITION OF JUDGMENTS.

I.


A . . Contrary . . E . . Contrary . . U
Subaltern
Contra-dictory
Contrary
Subaltern
Con-trary
Contrary
Inconſiſtent
I . Subcontrary . O . Subcontrary . Y

II.



There are five kinds of Oppoſition, Contradictory, Contrary, Inconſiſtent, Subaltern, and Subcontrary.

Contradictory oppoſition* is the moſt perfect, as we can infer both from the poſition of our judgment the removal of its contradictory, and from the removal of the judgment the poſition of its contradictory, as has been ſhewn above. It only exiſts between the judgments E and I. Other writers deſcribe A and O as contradictories; but the fact is that we cannot tell from the removal of O, whether we ought to replace it by A or U. Let the O "Some men are not rational animals" be removed, i. e. its truth denied, and that removal will not eſtabliſh the A, "All men are (ſome) rational animals." A third judgment is poſſible, namely that "All men are all rational animals"—the only rational animals there are and which of theſe two is to apply, cannot be inferred from the O, but muſt be aſcertained from the facts of the caſe.

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* *Ariſtotle* often called judgments of this kind ſimply "oppoſites" (ἀντικείμεναι), as if he conſidered contradictory oppoſition the oppoſition *par excellence*. *Waitz* on Org. ii. b. 16.

Contrary oppoſition exiſts between affirmative and negative judgments which cannot be true together, but which may be falſe together; that is, between A and E, E and U, E and Y, U and O, and A and O. From the poſition of a judgment we are able to infer the removal of its contrary; but the judgment may be removed or denied, without the poſition of the contrary. If it is laid down that "All men have a right to freedom," it becomes impoſſible to lay down that "No men have a right to freedom;" but of courſe it does not follow from the refuſal to admit that "All men have the right," that therefore *no* men have.

Inconſiſtent oppoſition lies between any two affirmative judgments which cannot be correct together, but may be falſe together; that is, between A and U, U and Y, and A and Y. Here it becomes neceſſary to attain a more preciſe notion of the difference between A and U. Suppoſe the example of U to be "Animals are things endowed with life and ſenſation;" which means—that "animals" and "things endowed with life and ſenſation" are but two modes of repreſenting the ſame thing, and are therefore interchangeable. Let the example of A be "All men are animals;"—can we ſay theſe two are the ſame? can we put "animals" wherever "men" ſhould come into our thoughts? No; "animals" is a very wide claſs, containing "men" and a vaſt number of other ſpecies. We mean by our judgment, not that men and animals are juſt the ſame things, but that men are *contained in* the wider claſs animals. This relation would be beſt repreſented to us by making "men" a ſmall circle, within "animals" a large one; whilſt the relation between ſubject and predicate in U would be beſt conceived as that of two equal circles laid one upon the other. Now every judgment which is really A, and not U, i. e. which really has an undiſtributed predicate, means that the predicate is wider than, and contains, the ſubject; whereas every U means as certainly that the predicate is no wider than the ſubject. It is true that we ſometimes form an A where we might form a U; as in ſaying that " All men are (*ſome*) rational animals," from a belief that in a higher ſtate of being, or in another planet, there may be rational animals to whom it would be improper, from their other characteriſtics to apply the name of men: when another diſbelieving the exiſtence of any creatures beſides men, to whom the name could apply, may hold that " All men are *all* rational animals." But this does not make the judgments true together. *Which* is true depends upon the facts; and the reaſon that two perſons hold the two judgments together, or one perſon holds them at different times, is that they know the facts with different degrees of correctneſs. Where the facts judged upon are fairly and fully known, an A and U can never repreſent them with equal correctneſs, nor can ever be true together. They are inconſiſtent.

Subaltern oppoſition is between any pair of affirmative or negative judgments, when the one has fewer terms diſtributed than the other. That in which there is more diſtribution is called the ſubalternant, and that which has leſs or none, the ſubalternate; or they may be termed the higher and lower. The inference here is that when the higher is laid down the lower follows; but nothing follows from denying the higher, or laying down the lower. I is the ſubalternate to A, O to E, I to U, and I to Y; ſo that from any A, U or Y follows an I, and from any E, an O. The name of oppoſition leſs properly applies here, as the relation of the judgments is really a partial agreement.

Subcontrary oppoſition is between particular judgments, of which one is affirmative and the other negative, viz. I and O, O and

Y. The name ſubcontrary is altogether arbitrary and without meaning, as the judgments have no real contrariety, but rather a preſumption of agreement. If "Some men are wiſe" be *the whole* truth, "Some men are not wiſe," its ſubcontrary, follows of courſe; and it has been ingeniouſly remarked by an old logician, that in this kind of oppoſition there is not the ſame ſubject in the two judgments, for we mean in one "Some men" and in the other "Some *other* men." Each pair of judgments *may* be true together; and I and O cannot be falſe together. The oppoſition of Y and O, though we have not given it a ſeparate name, has theſe peculiar properties, that if Y be true, O muſt be; and that they may be falſe together. To diſtinguiſh it, we may call it *falſe*-contrary oppoſition.

Two judgments* cannot be called oppoſites unleſs the ſame ſubject be joined with the ſame predicate at the ſame time and under the ſame circumſtances in both. "The Engliſh are very rich," and "The Engliſh are not very rich," may be true together, if Engliſh *capitaliſts* are referred to in the former, and *the public revenue* of England in the latter. Moreover, if the judgment imply an act of compariſon with ſome third thing as a ſtandard, the ſame ſtandard muſt be preſerved in the oppoſite judgment. It is not uncommon to hear two ſuch judgments as "This houſe is very large" and "This houſe is very ſmall," pronounced by two people who are comparing it with two different ſtandards, the one perhaps with his own little cottage, the other with Blenheim or Stowe. But theſe rules reſolve themſelves into one—we muſt be perfectly ſure, by diſtinctly underſtanding the ſubject and predicate, that they are in all reſpects the ſame in both judgments.

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* *Ariſtotle*, de Interp. ch. vi. § 5. The Latin logicians ſay that in both judgments we muſt ſpeak *de eodem, ſecundum idem, ad idem, eodem modo, eodem tempore.*

§ 53. *Converſion of Judgments, and Inferences from it.*

Converſion is the tranſpoſition of the ſubjeϲt and predicate of a judgment, to form a new one. The judgment to be converted is called the convertend, and the new one which reſults from the tranſpoſition, the converſe. By converſion, for example, "Some ſalts are fuſible," would become "Some fuſible ſubſtances are ſalts." The converſe, as having a different ſubjeϲt of thought (ſee § 35 and § 49) from the convertend, is a new judgment, not merely a different ſtatement of the convertend; for it cannot be the ſame to think of "ſalts" and aſcertain what can be attributed to them, as it is to think of "fuſible ſubſtances," and aſcertain what is to be predicated of *them*. And as the converſe depends entirely for its truth upon the convertend, we muſt regard it as an inference from it.*

In right converſion, the *quality* of the judgment is preſerved, and each term that was diſtributed is diſtributed in the converſe, but no other. Hence we cannot infer from "Some ſceptics are vicious" that "*All* vicious perſons are ſceptics;" we ſhould diſtribute the term "vicious perſons," where the premiſs exhibited it undiſtributed. Remembering this rule, we may diſpenſe with the common diviſion into ſimple,* and accidental, converſion. The ſix kinds of judgments give the following converſes reſpectively,

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* This is the view of many logicians beſides the Wolfian ſchool.

A is converted to Y
E . . . . . E
I I
O . . . . . η
U . . . . . U
Y . . . . . A

Upon the converſion of A it may be remarked, that ſince any judgment and its converſe are but two *forms* of the ſame *mat-*

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* Simple converſion is where the converſe is of the ſame Quantity as the Convertend; converſion *per accidens* where the rule of diſtribution given above, obliges us to make it particular. Thoſe who are curious about the matter will find an explanation of the expreſſion *per accidens* in *Keckermann,* Log. II. vi.

ter, i. e. two modes of thinking upon the ſame facts, we ought to be able to recover by re-converſion the ſame judgment we at firſt converted, otherwiſe, if we are obliged to reſt contented with a weaker form we find that our knowledge of the facts is leſs now than when we began to convert. By the common rules, A is to be converted to I, and that can only be reconverted to I.

The judgment O is uſually conſidered inconvertible by the ordinary method. But unleſs we regard the eſſential difference of ſubject and predicate, it is hard to ſee the reaſon. Unqueſtionably in ſuch a judgment as "Some ſubſtances do not tranſmit light," there are two terms, the diſtribution of which we know; why then may we not tranſpoſe them, into "No things which tranſmit light are ſome ſubſtances?" Becauſe every judgment ſhould expreſs ſome new truth concerning its ſubject, which this converſe appears not to do. The former judgment might be the reſult of experiments, and contains ſubſtantial information, namely that there are ſubſtances not permeable by light.

But it is uſeleſs to know that no things which tranſmit light are ſome ſubſtances, for after all they may be ſome *other* ſubſtances.[*] We ought to treat O then as inconvertible, becauſe its converſion ſeems to be fruitleſs.

§ 54. *Immediate Inference by means of Privative Conceptions.*

Every conception, we have ſeen,[†] has a correſponding conception called a privative. The poſitive conception has marks, but all we know of the privative is that thoſe marks are wanting to it. "Unwiſe," a privative conception, includes whatever "wiſe," the poſitive, does not. Now it is impoſſible to paſs any judgment upon a poſitive conception, without implying others upon the privative; and hence ariſe many immediate inferences. They are here ſubmitted in a tabular form,[‡] not of courſe to be committed to memory, but to be carefully examined, as a preparation for the practice of ſupplying ſimilar ones to any judgments that occur—an exerciſe favourable to acuteneſs, and readineſs in interchanging equivalent ſtatements. In the examples, privative words with the prefixed ſyllable *un* or *in*, have been employed, to avoid a multitude of puzzling negative particles. In each group of three judgments, the firſt is the premiſs, and the other two are inferences from it; and in the firſt diviſion the premiſs of each group contains poſitive conceptions; in the ſecond, privative.

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[*] See § 47. [†] See § 11.

[‡] Profeſſor *De Morgan* has furniſhed the pattern for

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this Table in his "Formal Logic," p. 61. The additions I have made are ſuch as the two additional judgments U and Y made indiſpenſable. No earlier writer has taken the trouble to draw out ſo carefully and clearly the various judgments in which privatives may be employed. The common books uſe it in two caſes, of which theſe are examples; "All animals feel," then "Nothing which does not feel can be an animal:" "Some judges are not juſt," then "Some not-juſt perſons are judges." *Ariſtotle* omits it. *Leibniz.* (Op. xx. p. 98. *Erdmann's* Ed.) indicates that there are many forms of privative predication, but does not purſue the ſubject.

DIVISION I.

A. All the righteous are happy;
Therefore, None of the righteous are unhappy;
And, All who are unhappy are unrighteous.

E. No human virtues are perfect;
Therefore, All human virtues are imperfect;
And, All perfect virtues are not human.

I. Some poſſible caſes are probable;
Therefore, Some poſſible caſes are not improbable;
And, Some probable caſes are not impoſſible.

O. Some poſſible caſes are not probable;
Therefore, Some poſſible caſes are improbable;
And, Some improbable caſes are not impoſſible.

U. The juſt are [all] the holy;
Therefore, All unholy men are unjuſt;
And, No juſt men are unholy.

Y. Some happy perſons are [all] the righteous;
Therefore, All who are unrighteous are unhappy;
And, No righteous perſons are unhappy.

DIVISION II.

A. All the inſincere are diſhoneſt;
Therefore, No inſincere man is honeſt;
And, All honeſt men are ſincere.

E. No unjuſt act is unpuniſhed;
Therefore, All unjuſt acts are puniſhed,
And, All acts not puniſhed are juſt.

I. Some unfair acts are unknown;
Therefore, Some unfair acts are not known,
And, Some unknown acts are not fair.

O. Some improbable caſes are not impoſſible;
Therefore, Some improbable caſes are poſſible;
And, Some poſſible caſes are not probable.

U. The unlawful is the [only] inexpedient;
Therefore, The lawful is the expedient;
And, The lawful is not the inexpedient.

Y. Some unhappy men are all the unrighteous;
Therefore, No happy men are unrighteous;
And, Some unhappy men are not righteous.

Let it be remarked that the ſubſtantives we inſert into theſe judgments prove that we do not divide the *whole univerſe* into happy and unhappy, juſt and unjuſt, &c. but ſome more limited claſs of exiſtences, ſuch as *caſes*, *acts*, *perſons*.* And as to the uſe of ſuch inferences as theſe, it may be noticed that men frequently throw a judgment into one of theſe inferential forms, before they can determine upon its acceptance or rejection. It would be natural, upon being aſſured that "All the righteous are happy," to exclaim—"What? Are all the unhappy perſons we ſee then to be thought unrighteous?" Among the above inferences there are no mere converſions, ſo that from any premiſs its converſe may be inferred beſides.

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* See § 11.

§ 55. *Immediate Inference by added Determinants.*

Some mark may be added to the ſubject and predicate, which narrows the extent of both, but renders them more definite—better *determined.* (§ 29) And from the ſimple judgment, we may infer that which has the additional mark, provided that the diſtribution of terms remain unchanged. Thus "A negro is a fellow creature, Therefore a negro in ſuffering is a fellow-creature in ſuffering." Even two judgments* may be amalgamated upon this principle; thus "Honeſty deſerves reward, and a negro is a fellow-creature, Therefore a negro who ſhows honeſty is a fellow-creature deſerving of reward."

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* See *Leibniz,* Op. XIX. Theor. 3. Si coincidentibus addantur coincidentia, fiunt coincidentia. Si $A = B$ et $L = M$ erat $A + L = B + M$. See alſo Op. XX. 4.

§ 56. *Immediate Inference by Complex Conceptions.*

This inference* is parallel to the laſt; inſtead of a new conception added as a mark to ſubject and predicate, the ſubject and predicate are added as marks to a new conception. For example, "Oxygen is an element, ſo that the decompoſition of oxygen would be the decompoſition of an element." Here again, the terms muſt be diſtributed in the concluſion or not, according to their diſtribution in the premiſs.

§ 57. *Immediate Inferences of Interpretation.*

It has been ſhown already (§ 48) that a judgment may be interpreted in two or three different ways, according to which of the two *wholes* of thought we bring into view. Theſe are not ſtrictly inferences from the judgment, becauſe whenever it is perfectly underſtood, they are parts of it; but relatively to a mind not fully perceiving all that the judgment really conveys, they are inferential, and we may call them inferences of interpretation.

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* See *Leibniz,* Op. XIX. Theor. 3. "Si eidem addantur coincidentia, fiunt coincidentia." This valuable paper would be much clearer, if the great author had diſtinguiſhed between extenſion and intenſion.

Lambert* has given one or two other formulæ which may come under the ſame title. "A is B, therefore B exiſts" and "A is B, therefore where A is we find B." Theſe may be reſolved into one, of which an example may ſhew the uſe. "Howard exhibited this high philanthropic ſpirit, therefore ſuch philanthropy really exiſts," i. e. is not merely imaginary. We make a tacit diſtinction between our notions of real objects and thoſe from imagination or from grounds that are palpably falſe.† Taking our notions of Socrates, Heracles, and the Chimæra, we ſee that in the caſe of Socrates a conviction is implied that he is a *real* perſon, in that of Heracles that the repreſentation we have of him is at moſt only partly real, in that of the Chimæra that it is a mere

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[*] Neues Org. 1. ch. i. § 259.

[†] See p. 94.

invention of the poets. In all our real notions we imply the mark of exiſtence, and a neglect of it leads invariably to an abſurdity. I cannot call it, with M. Duval-Jouve,* a judgment, becauſe it is rather the *reſult* of a former judgment; when we think of volcanoes, we do not *judge* that they exiſt, becauſe we have long ſince done ſo, and always think of them as exiſtent. Farther, every attribute of a real object is itſelf real; and therefore when we ſay "that Howard was an exalted philanthropiſt" we of courſe imply that the exiſtence of exalted philanthropy is eſtabliſhed by the fact of Howard's exiſtence. But where doubts were entertained that our ideal of philanthropy had ever been realized, the example before us would have place.

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* Logique. § 13. Alſo *Damiron*, Logique p. 12. who regards judgment as the termination of all the acts of the underſtanding, whereas in the preſent work it is treated as preparatory to conception, as undertaken for the ſake of more preciſe and complete notions. But of courſe an "Exiſtential judgment" may be formed, as any other analytic judgment may, with any real conception as the ſubject; "Man exiſts, the world exiſts." Compare *Reid*, Eſſay vi. ch. 1, p. 413, of Sir *W. Hamilton's* Edition.

§ 58. *Immediate Inference from a Disjunctive Judgment.*

A disjunctive judgment expreſſes an act of Diviſion, as "The teeth are either inciſors, canine, bicuſpid or molar teeth." According to the rule of mutual excluſion of the dividing members (§ 31) we might infer from the judgment juſt given, that "The molar teeth are neither inciſors, canine, nor bicuſpid." According to another rule, that the members muſt completely exhauſt the diviſum, we infer that the part of the diviſum not contained in one member, muſt be in ſome other. "All teeth which are not molar, are either canine, inciſors, or bicuſpid teeth."

FORMULA I.

All A is X Y or Z.
Therefore the X of A is not the Y or Z of A.

FORMULA II.

All A is X Y or Z.
Therefore the not-X of A is the Y or Z of A.

§ 59. *Immediate Inference by the Sum of ſeveral Predicates.*

After examination of the properties of any ſubject, it is neceſſary to collect the various predicates which have been aſſigned it, in order to combine them for a definition. The definition of copper, for example, that it is "a metal—of a red colour—and diſagreeable ſmell—and taſte—all the preparations of which are poiſonous—which is highly malleable—ductile—and tenacious— with a ſpecific gravity of about 8·83," is the reſult of as many different prior judgments as there are properties aſſigned. From a ſufficient number of judgments in A, having the ſame ſubject, a judgment in U may be inferred, whoſe predicate is the ſum of all the other predicates.

§ 60. *Concluding Remark.*

Whilſt it is at once admitted that theſe immediate inferences—ſyllogiſms of the underſtanding as they are called,* not amount-ing to reaſoning—are obvious enough when they appear ſingly, the great number and variety of them, may be thought a ſufficient reaſon for examining them. Could any perſon not accuſtomed to exerciſes of this kind, draw out fully *all* his own meaning, when he utters the ſimpleſt propoſition? I think not. The judgment "All men are mortal," (a plainer cannot be found) tells us—that man is one ſpecies in the claſs of mortal beings—that the mark of mortality ſhould always accompany our notion of man—that the word mortal is a name which may rightly be given to man—that, if *all* are mortal, any one man is—that any ſtatement which affirms that no men are mortal muſt be quite falſe—that even the ſtatement that *ſome* men are not mortal is equally falſe—that ſince man is contained in the claſs of mortal things, which is a wider claſs, it would be wrong to ſay all mortal things are men—that, however, the aſſertion "Some mortals are men" would be true enough—even "Some mortals are *all* men"—that no men can be immortal—that any immortal beings muſt be other than men — that mortality really exiſts, being found in man, whom we know to exiſt—that a man with immortal hopes is a mortal with immortal hopes—that (ſince heaven is immortality) a man expecting heaven is a mortal looking for immortality—that he who honours a man, honours a mortal. Thus from this ſimple judgment fourteen judgments have unfolded themſelves, or, as ſome would ſay, the judgment has been put in fifteen different ways, in the laſt three of which only is any new matter introduced. And yet any man of common ſenſe would ſay that his propoſition really implied them. And having undertaken to give an analyſis of the whole proceſs of thinking, we could not well omit inferences which form ſo large a part of it.

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* By *Kant* and his ſchool.

§ 61. *General Canon of Mediate Inference.*

The law upon which all mediate inference depends may be thus expreſſed. *The agreement or diſagreement of one conception with another, is aſcertained by a third conception, inaſmuch as this, wholly or by the ſame part,* *agrees with both, or with only one of the conceptions to be compared.* The mediate ſyllogiſm or (as it is uſually called) the ſyllogiſm is a compariſon of any two notions with a third, in order to aſcertain whether they agree or not. Suppoſe the queſtion is whether this diſeaſe is mortal; in order to aſcertain the agreement of the two notions, ſo that we may ſay "This diſeaſe is mortal," we find a third notion, that it is a conſumption, which we know to be mortal, and then the whole ſyllogiſm will be

All conſumptions are mortal
This diſeaſe is a conſumption;
Therefore it is mortal.

All the properties of a ſyllogiſm depend upon the Canon juſt laid down; as will be ſeen when they are enumerated.

1. A ſyllogiſm will contain three notions and no more, namely, the two whoſe agreement or diſagreement we ſtrive to aſcertain, and the third which we employ as a means of doing ſo. They are called *terms;* and the third notion, interpoſed between the others in order to compare them, is the

middle term, whilſt the other two may be called from their place in the concluding judgment of the ſyllogiſm, the *ſubject* and *predicate.*

Formerly, the ſubject of the concluſion was called the *minor* term, and the predicate the *major*, becauſe in one form of inference, ſuppoſed to be the moſt perfect, the major was by its poſition moſt extenſive, and the minor leaſt; thus, in the ſyllogiſm "All men are mortal, Socrates is a man, therefore Socrates is mortal"—mortal, the major term, is more extenſive than Socrates, the minor; for, in mortal we include Socrates and all other men. But in negative inference it is impoſſible to aſcertain the comparative extent of the terms. If the concluſion were, "No beaſts of prey are ruminant," it would be impoſſible to aſcertain which term were the more extenſive,—whether "beaſts of prey" applied to more objects than ruminant—inaſmuch as the judgment itſelf declares that they have nothing to do with one another, and one cannot therefore be applied to meaſure the other. The ſo-called major term might happen to be a good deal leſs than the minor. When the concluding judgment is particular, the ſame abſurdity attaches to the names. In "Some brave men are prudent" it is impoſſible to ſay whether brave men or prudent men is the more extenſive. The names of major and minor then are only deſcriptive, when applied to ſome particular forms of ſyllogiſm. But they are ſo interwoven with logical phraſeology, that it will be better occaſionally to annex them in a parentheſis to the leſs objectionable ones.

2. A ſyllogiſm muſt contain three judgments and no more. Since it contains three terms, each of which is to be compared, once only, with every other, there would be three acts of compariſon, each expreſſed by a judgment. Three terms cannot be joined in more than three pairs without repetition.

The two judgments in which the middle term occurs, are called the premiſſes, and the remaining one the concluſion. That premiſs in which the predicate (major term) is compared with the middle, was formerly called the Major premiſs, and the other, in which the ſubject (minor term) occurs, was the Minor premiſs. The former was alſo ſometimes called the Propoſition, and the latter the Aſſumption, and ſometimes the Subſumption. But all theſe names are inconſiſtent with the wider view of inference now taken; and it will be ſufficient to call the premiſſes *firſt* and *ſecond*, the firſt being always that in which the predicate of the concluſion occurs, whether it ſtands firſt in order or not.

3. One premiſs at leaſt muſt be affirmative. The canon provides that one term at leaſt muſt agree with the middle, that is, muſt be united with it in an affirmative judgment; and without this, there can be no inference about the two terms which are to be compared. With the premiſſes "No raſh man can be a good general, and Xenophon was not a raſh man," we could neither have the concluſion that Xenophon *was* a good general, nor that he was *not*. The premiſſes afford no data for diſcovering in what ſort of judgment the terms Xenophon and good general may come together.

4. The *worſt* relation of the two terms with a third, that may be eſtabliſhed in the premiſſes, ſhall be expreſſed in the concluſion. Now the beſt and moſt intimate relation of two terms is that of abſolute identity of matter, as in "An animal is a being with life and ſenſation;" the next exiſts where the whole of one term coincides with part only of the other, as in "All organized ſtructures decay;" the loweſt relation, where part of one term coincides with part of another, as in "Some flowers are blue." If the two premiſſes expreſs two different relations, the concluſion muſt follow the *inferior*. Thus "All triangles = figures with three ſides, A B C is a triangle, Therefore A B C is (ſome) figure with three ſides:" where the chief-predicate though diſtributed in the premiſs is not in the concluſion. The worſt poſitive relation then which the premiſſes contain, is all that can be inferred in the concluſion.

5. On a ſimilar principle, if one of the premiſſes be negative, the concluſion muſt alſo be negative. The Canon only ſuppoſes two conditions, under one of which an infe-

rence muſt be made; that of agreement of two terms with a third, expreſſed by affirmative premiſſes, and conſequent agreement of the two terms, expreſſed by an affirmative concluſion; and that of agreement of one term and diſagreement of another with the third term, expreſſed in an affirmative and a negative premiſs, and conſequent diſagreement of the two terms, expreſſed in a negative concluſion. The latter condition obtains wherever there is a negative premiſs, and therefore the concluſion will alſo be negative.

6. The compariſon of each of the two terms muſt be either with the whole, or with the ſame part, of the third term. And to ſecure this either the middle term muſt be diſtributed in one premiſs at leaſt, or the two terms muſt be compared with the ſame ſpecified part of the middle, or in the two premiſſes taken together the middle muſt be diſtributed and ſomething more, though not diſtributed in either ſingly.

> The wiſe are good
> Some ignorant people are good
> Therefore ſome ignorant people are wiſe.

This is only a ſyllogiſm in appearance, for the two terms have only been compared with part of the third term good; if the wiſe are *ſome* good people, and ſome of the ignorant are *ſome other* good people, we have compared with two different parts of a term, which is the ſame as uſing two different terms—a condition not contemplated by the Canon, and one under which there can be no inference whatever. But in the next example the two terms meet upon common ground in the third term, becauſe the *whole* of it is once introduced.

> All the mineral acids are poiſons
> Spirit of ſalt is a mineral acid
> Therefore it is a poiſon.

Here, to whatever portion of the claſs of "mineral acids" we refer "ſpirit of ſalt," it muſt be a poiſon, becauſe *the whole claſs* of mineral acids was brought in as poiſonous, ſo the inference is good. If the firſt premiſs were "*half* the mineral acids are poiſons" there would be no inference, becauſe the "ſpirit of ſalt" might be in the other half. There would be a compariſon with two different parts only of a third term.

The next example ſecures a compariſon

with the ſame part of a third term, not indeed by bringing in every part of it but by ſpecifying which part is intended in both premiſſes alike.

Certain Sciences are claſſificatory
Theſe ſciences = Mineralogy, Botany and Zoology
Therefore Mineralogy, Botany and Zoology are claſſificatory.

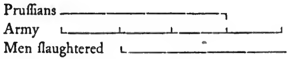
The ſame part of the term ſciences being uſed, the other two terms muſt agree. But it is more correct to regard "certain ſciences" as the whole of a ſmaller term (§ 47), than as the part of a larger, ſciences in general. The word "certain" marks it off ſo definitely that we may conſider it a diſtinct conception.

In the next example, that unuſual mode of diſtribution is ſeen, which is gathered from the two premiſſes combined, although neither contains it ſeparately.

Three-fourths of the army were Pruſſians
Three-fourths of the army were ſlaughtered
Therefore ſome who were ſlaughtered were Pruſſians.

For, even ſuppoſing that the whole of that fourth that were not Pruſſians, but (ſay) Auſtrians, were ſlaughtered, there ſtill remain two fourths, mentioned in the ſecond premiſs as ſlaughtered, who muſt have been Pruſſians.

And this kind of inference may be drawn wherever the mode of expreſſion ſatisfies us that ſomething *more than all* the middle term has been mentioned in the premiſſes; the extent of the agreement between the terms of the concluſion being exactly meaſured by the exceſs, over and above the whole of the middle term. Thus, "three-fourths of the army," taken twice, make ſix-fourths, ſo that the terms of the concluſion agree to the extent of two-fourths at leaſt of the middle term. Let theſe three lines repreſent the terms.



It appears that the middle line, for two-fourths of its length, runs parallel with both the others, and for that diſtance therefore they run along with each other.

7. Neither term of the concluſion muſt be diſtributed, unleſs it has been ſo in its premiſs. For, the reſult of the compariſon as ſtated in the concluſion muſt not be greater than the compariſon itſelf as made in the premiſſes; if therefore *all* of a term appears in

the concluſion as agreeing with another, a compariſon of all of it with the middle muſt have been made in the premiſſes.

Such an inference as

Pittacus is good
Pittacus is wiſe
Therefore *all* wiſe men are good,

is faulty, becauſe the premiſſes do not contain "*all* wiſe men."

Theſe ſeven general rules of ſyllogiſm are not new principles, to be ſtudied in connexion with the Canon. They are directly evolved from it, and are ſo many cautions to employ it properly. The Rule of Syllogiſm is one and one only, but its conſequences are various, and the conciſe form of expreſſion adopted in it renders ſome development of them neceſſary, which theſe general rules are calculated to ſupply. They ſhould be ſtudied till they are perfectly underſtood,* but the Canon alone need be committed to memory.

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* They may be remembered by the following hexameters.

Diſtribuas medium, nec quartus terminus adſit,
Utraque nec præmiſſa negans [nec particularis]
Sectetur partem concluſio deteriorem,
Et non diſtribuat, niſi cum præmiſſa, negetve.

§ 62. *Order of the Premiſſes and Concluſion.*

Although an invariable order for the two premiſſes and concluſion, namely, that the premiſs containing the predicate of the concluſion is firſt, and the concluſion laſt, is accepted by logicians, it muſt be regarded as quite arbitrary. The poſition of the concluſion may lead to the falſe notion that it never occurs to us till after the full ſtatement of the premiſſes; whereas in the ſhape of the problem or queſtion it generally precedes them, and is the cauſe of their being drawn up. In this point the Hindu Syllogiſm (ſee p. 5) is more philoſophic than that which we commonly uſe. The premiſſes themſelves would aſſume a different order according to the occaſion. It is as natural to begin with the fact and go on to the law, as it is to lay down the law and then mention the fact. "I have an offer of a commiſſion; now to bear a commiſſion and ſerve in war is (or is not) againſt the divine law; therefore I am offered what it would (or would not) be againſt the divine law to accept." This is an order of reaſoning employed every day, although it is the reverſe of the technical; and we cannot call it forced or unnatural. The two kinds of ſorites, to be deſcribed below, are founded upon two different orders of the premiſſes; the one going from the narroweſt and moſt intenſive ſtatement up to the wideſt, and the other from the wideſt and moſt extenſive to the narroweſt. The logical order cannot even plead the ſanction of invariable practice.* Neither the ſchool of logicians who defend it, nor thoſe who aſſail it, take a comprehenſive view of the nature of inference. Both orders are right, becauſe both are required at different times. The one is analytic, the other, ſynthetic; the one, moſt ſuitable to enquiry, and the other to teaching.

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* "In confirmation of the doctrine that the common order of the premiſſes ſhould be reverſed, may be added, what not one of its modern advocates ſeems to be aware of, that this, inſtead of being a novel paradox, is an old, and until a comparatively recent period, an all but univerſal practice. It is not even oppoſed by *Ariſtotle*. For to ſay nothing of certain ſpecial recognitions by him of the legitimacy of this order, his uſual mode of ſtating the ſyllogiſm in an abſtract or ſcientific form, affords no countenance to the prior poſition, in vulgar language of what logicians call the major propoſition. *Ariſtotle* is therefore to be placed apart. But in regard to the other ancient logicians, who caſt their ſyllogiſms in ordinary language, I am able to ſtate as follows; and this in di-

§ 63. *The Three Figures.*

Syllogiſms have been divided into three Figures, according to the poſition of the middle term in the premiſſes. This may be the ſubject of the firſt premiſs (major) and the predicate of the ſecond (minor), in which

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rect contradiction not only of the implicit aſſumptions of our later logicians, but of the explicit aſſertions of ſome of the moſt learned ſcholars of modern times; that the Greeks (Pagan and Chriſtian, Peripatetic, Academic, Stoic, Epicurean and Sceptic) down to the taking of Conſtantinople, with very few exceptions, placed firſt in ſyllogiſtic order what is called the minor propoſition. The ſame was done by the Arabian and Hebrew logicians." [I may add the Hindu *Gotama* to theſe authorities.] "As to the Latins they, previous to the ſixth century, were in uniſon with the Greeks. To the authority and example of *Boethius* I aſcribe the change in logical practice. He was followed by the Schoolmen, and from them the cuſtom has deſcended to us." *Sir W. Hamilton.*

caſe we ſay that the ſyllogiſm is of the Firſt Figure: or it may be the predicate of both, which conſtitutes a ſyllogiſm of the Second Figure: or the ſubject of both, which gives the Third Figure. Thus,

I.	II.	III.
M P	P M	M P
S M	S M	M S
∴ S P	∴ S P	∴ S P

It has been uſual to call the firſt Figure the moſt perfect, becauſe it exemplifies moſt directly a certain law of ſyllogiſm called the *dictum de omni et nullo.* The law is to this effect*—"Whatever is affirmed or denied of a claſs, may be affirmed or denied of any part of that claſs;" ſo that if one affirms of plants that they require light, one may affirm it alſo of ſunflowers, as a part of the

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[*] *Ariſtotle,* Cat. ch. 5. *Kant* puts it *Nota notæ eſt nota rei ipſius,* viewing the intenſion of the judgments. *Leibniz, Contentum contenti eſt contentum continentis,* viewing (I think) their extenſion. *Leib.* ſeems to employ *includere* for the Ariſtotelian *ὑπάρχειν,* the word that refers to the intenſion of terms; but he does not ſufficiently diſtinguiſh between the two.

claſs of plants. This would require three judgments, one to ſtate what we meant to affirm of the claſs—"All plants need light;"—a ſecond to mention ſomething as part of the claſs, "Sunflowers are plants;" and a third to affirm the ſame of the part as had been affirmed in the outſet of the whole; "Sunflowers require light." Theſe three judgments, it will be found, have their terms arranged according to the firſt figure. And on the aſſumption that the *dictum de omni et nullo* was the paramount law for all perfect inference, and therefore the firſt figure was alone perfect,* rules have always been given for reducing, as it is termed, every ſyllogiſm in the leſs perfect figures to the firſt. This can readily be done by changing the order of the terms by converſion, or, in the few caſes in which converſion will not apply, by ſubſtituting a privative for a poſitive judgment,* and then converting. But the queſtion was raiſed —is the *dictum* the ſole law of perfect inference? Is it not ſimply an account of the proceſs of the firſt figure, and might not each of the other figures have its *dictum* too? The diſcovery of new *dicta*† put the proceſs of reduction in a new light. Each of the figures was found to have its own functions, and an attempt to bring the two laſt to the firſt figure, only ſpoilt them as examples of their own rules. Reduction was therefore unneceſſary.

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* *Ariſtotle*, Pri. An. I. ch. 5 and 6. *Kant*, in a little Tract, goes over the ſame ground, contending that all the figures but the firſt, require the converſe of one or other of the judgments to be inſerted, to make them pure and natural acts of reaſoning. My reaſon for diſſenting will be given in the text.

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* See § 54.

† Theſe are not introduced into the text, becauſe they belong to a ſyſtem of Logic in which no affirmative judgment was held to diſtribute its predicate, and in which, to comply with the general rules of ſyllogiſm, the ſecond figure muſt always have a negative concluſion, and the third a particular. With our preſent enlarged liſt of judgments, they would have a very partial application. However, to illuſtrate the older treatiſes they are here given. In the 1ſt Fig. the dictum given above. The Fig. is uſeful in arguing from a general to a ſpecific ſtatement. For the 2nd Fig. the *dictum de diverſo*—"if one term is contained in, and another excluded from, a third term, they are mutually excluded." Uſeful for ſhowing the differences of things, and preventing confuſion of diſtinct conceptions. For the 3rd Fig. the *dictum de exemplo*—"Two terms which contain a common

We muſt not ſuppoſe that the diviſion of ſyllogiſms according to the figures is a mere uſeleſs ſubtlety, the reſult of an arbitrary attempt on the part of logicians to diſplay the middle term in every poſſible poſition. For, firſt, the premiſſes we chooſe to eſtabliſh ſome concluſion by, may be judgments to which we are ſo accuſtomed, that it would be unnatural to take their converſe inſtead, as might be requiſite to bring them into

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part, partly agree, or if one contains a part which the other does not, they partly differ." Uſeful for bringing in examples, and for proving an exception to ſome univerſal ſtatement. Thus, if it were ſtated that all intellectual culture improved the heart and conduct, it would be natural to ſay, in this Figure, Mr. So and So does not act as he ought, yet "Mr. So and So is a perſon of cultivated mind, therefore one perſon at leaſt of cultivated mind does not act as he ought." See *Keckermann*, Logic III. ch. 7, 8, and 9. Alſo *Lambert*, N. Org. I. iv. §. 229. But Mr. *Mill* is in an error, ſhared by *Buhle* (Geſchichte, vi. 543) *Troxler* (Logik ii. p. 62), in thinking that *Lambert* invented theſe *dicta*. *Keckermann's* work had put them before the world more than a century earlier. *Keckermann* however ignored the 4th Figure, and *Lambert's* explanation of that may be new.

the firſt Figure. It makes ſome difference whether "Kings can do no wrong" is to be the judgment, or the much more awkward form "Some perſons who can do no wrong are kings." But, next, it did not eſcape Ariſtotle that the more extenſive of two terms ought to be the predicate, that the genus ſhould be predicated of the ſpecies. This is the natural, though not invariable, order; and it is worthy of remark that in negative judgments, where from the negation the two terms cannot be ſet together to determine their reſpective extenſion, if, apart from the judgment, we know that the one is a ſmall and the other a large claſs, the one a clearly determined and the other a vague notion, we naturally take the ſmall and clearly determined conception for our ſubject. Thus it is more natural to ſay that "The Apoſtles are not deceivers" than that "No deceivers are Apoſtles." So that, if our minds are not influenced by ſome previous thought to give greater prominence to the wider notion, and ſo make it the ſubject, reverſing the primary order, the figure of the ſyllogiſm will be determined by the extenſion of the middle term. If this term is obviouſly wider than the other two, the ſecond will be the natural figure, becauſe there it will be predicated of both. If again, it is obviouſly narrower than both, the third, in which it can ſtand twice as ſubject, will be the natural figure. Thus when it was deſirable to ſhow by an example that zeal and activity did not always proceed from ſelfiſh motives, the natural courſe would be ſome ſuch ſyllogiſm as the following.

> The Apoſtles ſought no earthly reward,
> The Apoſtles were zealous in their work,
> Some zealous perſons ſeek not earthly reward.

Admitting that where the extenſion of the conceptions is not very different, either of them would ſtand ſubject as well as the other, we contend that ſince in ſome caſes natural reaſon preſcribes the third figure or the ſecond, and rejects the firſt, the doctrine of the diſtinction of three figures is not a mere arbitrary invention, but a true account of what takes place in the mind.

§ 64. *Special Canons of the Figures.*

Although the Canon of Syllogiſm applies

ſufficiently to all the figures, it is poſſible to modify it ſo as to comprehend the order of the terms in each figure.*

Canon of the Firſt Figure.

In as far as two notions are related, either both poſitively, or, the one poſitively and the other negatively, to a third notion, to which the one is ſubject, and the other predicate, they are related poſitively or negatively to each other as ſubject and predicate.

Canon of the Second Figure.

In as far as two notions, both ſubjects, are, either each poſitively, or, the one poſitively, the other negatively, related to a common predicate notion,—in ſo far are thoſe notions poſitively or negatively ſubject and predicate of each other.

Canon of the Third Figure.

In as far as two notions, both predicates, are, either each poſitively, or, the one poſitively and the other negatively, related to a common ſubject notion,—in ſo far are thoſe notions poſitively or negatively ſubject and predicate of each other.

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* Theſe are communicated by *Sir W. Hamilton.*

§ 65. *The Fourth Figure.*

Beſides the three that have been given already, only one other combination of the terms of a ſyllogiſm is poſſible, namely, where the middle is predicate of the firſt (major) and ſubject of the ſecond (minor) premiſs. The introduction of this combination as a fourth figure, is attributed to Galen on the authority of Averroes.* It would fall into this form—

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* The words of *Averroes* are *Et ex hoc planum, quod figura quarta, de quâ meminit Galenus, non eſt ſyllogiſmus ſuper quem cadet naturaliter cogitatio.* (In 1 Pri. An. ch. viii. vol. i. p. 63.) Zabarella has written a book in anſwer to Averroes' remarks againſt this figure (Op. Log. p. 101). I have inſpected the Dialectic of *Galen,* publiſhed for the firſt time at Paris in 1844, by Minoides Menas, a Greek, from a MS. of the eleventh century found in the Eaſt; and am of opinion—that Galen did not adopt the *fourth* figure, and that an occaſional tranſpoſition of the premiſſes in the 1ſt figure may have led to the erroneous belief that he did. That his modern editor confounds the 1ſt and 4th figures is beyond diſpute.

P M
M S
∴ S P

Many logicians have condemned the uſe of this figure. It is deſcribed as a mere perverſion of the firſt, in which the proper concluſion does not appear, but the converſe of it, gained by immediate inference. The meaning of this will appear from an example (taken from Abp. Whately's Logic).

What is expedient is conformable to nature,
What is conformable to nature is not hurtful to ſociety,
What is hurtful to ſociety is not expedient.

Here it is contended that the mind naturally expects the converſe of the concluſion,—What is expedient is not hurtful to ſociety,—which would bring it at once to a ſyllogiſm in the *firſt* figure, and that we tacitly draw the proper concluſion before paſſing on to the unnatural one. But whilſt it is plain that ſuch a concluſion from ſuch premiſſes diſappoints the expectation, we are unwilling to admit that there is any interpolation of a judgment, without ſome good reaſon, eſpecially as Kant ſuppoſed the ſame ſort of proceſs to have place in the 2d and 3d figures alſo, where it is certainly not required. The reaſon now to be given for diſmiſſing the 4th figure as really an indirect way of ſtating the 1ſt, has not, it is believed, been pointed out before. The ſubject and predicate, we remarked, are different in order of thought, the ſubject being thought of for itſelf, and the predicate for the ſubject. Now in the 1ſt figure, the ſubject of the concluſion was a ſubject in the premiſſes, and the predicate was a predicate, ſo that the order of thought is ſtrictly preſerved. So to ſpeak, we do not depoſe a ſubject, and ſet up a predicate in its place. No primary thought becomes ſecondary nor any ſecondary primary.

All M is P
All S is M
∴ All S is P

The concluſion no way diſturbs the order of terms eſtabliſhed in the premiſſes. But in the 2d figure, the order is ſomewhat difturbed; the ſubject of the concluſion was indeed a ſubject in the premiſſes, but the predicate was not a predicate.

No P is M
All S is M
∴ No S is P

This makes the figure one degree leſs natural than the firſt; it departs from directneſs in its uſe of the predicate (major term). In the third figure the ſame indirectneſs occurs; the ſubject of the concluſion was not a ſubject in its premiſs. But in the fourth figure the order is wholly inverted, the ſubject of the concluſion had only been a predicate, whilſt the predicate had been the leading* ſubject in the premiſs. Againſt this the mind rebels; and we can aſcertain that the concluſion is only the converſe of the real one, by propoſing to ourſelves ſimilar ſets of premiſſes, to which we ſhall always find ourſelves ſupplying a concluſion ſo arranged that the ſyllogiſm is in the firſt figure, with the ſecond premiſs firſt.

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* From ſtanding firſt; πρῶτον τῇ θέσει.

§ 66. *The unfigured Syllogiſm.*

A ſyllogiſm may be ſtated without making the terms either ſubjects or predicates; ſo that it belongs to no figure.* Thus "ſince copperas and ſulphate of iron are identical, and ſulphate of iron and ſulphate of copper are not identical, it follows that copperas and ſulphate of copper are not identical."

§ 67. *Modes of Syllogiſm.*

The *mode* of a given ſyllogiſm is the formal value of its three judgments; as expreſſed by the three letters that denote them. Theſe, with the addition of the number of the figure to which it belongs, convey the whole form of the ſyllogiſm; thus A I I. Fig. I. is known to mean

All M is P
Some S is M
∴ Some S is P

The few perſons who take the trouble to

---

* Sir W. Hamilton.

analyſe the arguments of works they read, by noting theſe and like ſymbols in the margin, will bear witneſs to the attention and exactneſs which the practice cultivates, and to the not unfrequent detection of fallacies by means of it.

§ 68. *Table of all the Legitimate Modes in all Figures.*

The following Table is an index of the modes in which a good inference can be drawn.* It is arranged according to the order in which the vowels occur in the alphabet, ſo that, when any mode has been omitted, as not available for inference, the eye can detect and ſupply it, and the mind examine the reaſon for its omiſſion.

Some of theſe modes exemplify different ſpecial rules and theorems of logical writers, of which a few are ſubjoined.

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* Another Table is given below, with ſuch additional modes as contain the doubtful negative judgments η and ω.

FIG. I.	FIG. II.	FIG. III.
AAA....	....	AAI
	AEE....	
AII....	....	AII
	AOO....	
AUA....	AUY....	AUA
AYI....	AYY....	AYA
EAE....	EAE....	EAO
EIO....	EIO....	EIO
EUE....	EUE....	EUE
EYO....	EYO....	EYE
		IAI
IUI....	IUI....	IUI
IYI....	IYI....	
		OAO
OUO....	....	OUO
OYO		
UAA....	UAA....	UAY
UEE....	UEE....	UEE
UII....	UII....	UII
UOO....	UOO....	UOO
UUU....	UUU....	UUU
UYY....	UYY....	UYA
	YAA....	YAY
YEE....	....	YEE
	YII....	
YOO....		
YUY....	YUA....	YUY
YYY....	YYI....	

Fig. I. A A A and A A I are the only modes to which the *dictum de omni* directly applies—" Whatever is ſaid of a claſs may be ſaid of a contained part of the claſs."

Fig. I. A U A is a formula into which a " perfect

induction" might fall, where we affirm ſomething of a whole claſs, becauſe we have found it true of all the individuals or ſpecies which the claſs contains. Thus

x y and z are P
S = x y and z
Therefore S is P

Leibniz gives the formula "Cui ſingula inſunt, etiam ex ipſis conſtitutum ineſt."

Fig. I. E A E and E I O are the only modes to which the *dictum de nullo* applies. "What is denied of a claſs muſt be denied of any part of the claſs.

E U E and U E E in all figures. "Si duorum quæ ſunt eadem inter ſe unum diverſum ſit a tertio, etiam alterum ab eo erit diverſum." Leibniz.

Fig. I. and II. U A A. "Quod ineſt uni coincidentium, etiam alteri ineſt." Leibniz.

M = P
All S is M
.·. All S is P

U U U in all figures. "Quæ ſunt eadem uni tertio, eadem ſunt inter ſe."

§ 69. *A mode of Notation.*

To be able to repreſent to the eye by figures the relation which ſubſiſts in thought between conceptions, tends ſo greatly to facilitate logical analyſis, that many attempts have been made to attain it. Of two important ſchemes, that of Euler and that which Sir W. Hamilton has by improving made his own, an account will be given hereafter. The ſcheme now to be explained is that which Lambert makes uſe of, in his *Neues Organon*.

A diſtributed term is marked by a horizontal line, with the letter S, P or M attached, to denote that it is the ſubject, predicate or middle term of the ſyllogiſm.

P ————

An undiſtributed term is marked, not by a definite line, but by a row of dots, to ſhow its indefiniteneſs, thus

S . . . .

Theſe are the two forms of quantity in which ſeparate conceptions may occur. But when two conceptions are joined in a judgment, another power as to quantity muſt be repreſented alſo. Let the judgment be, "All plants are organized," and let the lower line repreſent the ſubject and the upper the predicate; will this repreſentation convey the whole truth?

P . . . .
S ————

In one point it is inadequate, that the term "organized" is not wholly indefinite. We mean indeed by it, only *ſome* organized things; but then one part of it is *made* definite by affirming it of plants. We do not know how many, or what, individuals, come into the conception "Some organized things" by itſelf; but when it occurs in this judgment, we are certain of ſome individuals in it, viz. thoſe which are "all plants." This we are able to expreſs by a line partly definite, partly undetermined, thus

P ..... ———— ....
S ————

Every affirmative judgment may be repreſented by a line drawn *under* another, the lower being always the ſubject. Negative judgments, which expreſs that one conception cannot be contained under another, are repreſented by two lines drawn *apart from* each other, the predicate being a little higher than the ſubject, thus—

P ————
S ————

But in a ſyllogiſm there are three terms, ſo that we require three lines to repreſent their relations; and the diagram thus drawn will ſupply ſome important illuſtrations of the nature of inference. Suppoſe the premiſſes are "All matter undergoes change, and the diamond is a kind of matter," the relations of the three terms may be thus exhibited.

P . . . ———— . . . .
M ————
S ———

From this notation beſides the two premiſſes given,

1. All M is P
2. All S is M

we may by reading downwards, gather that

3. Some P is M, and
4. Some M is S

which are in fact immediate inferences by converſion from each of the premiſſes reſpectively. But further, from knowing that M ſtands under P, and S under M, we have learnt that S ſtands alſo under P, and this we may expreſs, leaving M altogether out of our ſtatement,

5. All S is P
6. Some P is S,

the former being the proper concluſion from our premiſſes, and the latter the converſe of the concluſion.

Where our premiſs is negative, and by the canon of ſyllogiſm one only can be of that quality, the notation will be

P ———

M ———

S ——

which would be read thus,

No M is P
All S is M
Therefore, No S is P.

Finally, every univerſal judgment of ſubſtitution, or U, may be expreſſed by two equal lines

P ——————

S ——————

But when ſuch a judgment expreſſes a logical diviſion, as "Organized beings are either plants, brutes or men," the divided character of the predicate may be expreſt by breaking up the line which repreſents it, thus

P —— x —— y —— z

S ——————

which would be read, "All S is either x y or z." The contrary proceſs, of logical compoſition, which is uſed to expreſs induction, as "Plants, brutes, and men are the only organized beings" would appear as

P ——————————
S ——x——y——z

and be read "x y z make up the ſum of P."
—The reader will find great advantage in comprehending the rules of ſyllogiſm, from figuring the ſyllogiſms to which they happen to apply, according to theſe directions.*

§ 70. *Equivalent Syllogiſms.*

Though the Reduction of Syllogiſms, from a ſo-called imperfect, to the perfect, figure, is no longer requiſite, now that the power of the *dictum de omni et nullo* is confined to the proper limits, the relations of three conceptions can be expreſſed, commonly, in more than one ſyllogiſm of the ſame figure, and always in different figures. And the advantage of any adequate ſyſtem of notation is that it not only repreſents to us the ſyllogiſm itſelf, which is one way of ſtating the mutual bearing of three conceptions, but, in making that mutual bearing viſible, it furniſhes the means of ſtating it in other ſyllogiſms. An example will illuſtrate this.

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* This ſcheme of notation has likewiſe been improved by *Sir William Hamilton*, but the view in the text is quite ſufficient for our preſent purpoſe.

" No agent more effectually imitates the natural action of the nerves, in exciting the contractility of muſcles, than Electricity tranſmitted along their trunks, and it has been hence ſuppoſed, by ſome philoſophers, that electricity is the real agent by which the nerves act upon the muſcles. But there are many objections to ſuch a view; and this very important one among the reſt,—*that electricity may be tranſmitted along a nervous trunk which has been compreſſed by a ſtring tied tightly round it, whilſt the paſſage of ordinary nervous power is as completely checked by this proceſs, as if the nerve had been divided.*"* This argument may be thrown into the following ſyllogiſm, as the moſt direct form of ſtatement.

---

* *Carpenter.* Animal Phyſiology, p. 437.

Electricity will travel along a tied nerve.
The nervous fluid will not travel along a tied nerve,
∴ The nervous fluid is not electricity.

This is a ſyllogiſm in the ſecond figure, and of the mode A E E, which will be found in the Table in the preceding ſection, and is therefore a valid mode. The middle term is the conception "Travelling along a tied nerve;" and one of the other terms is under it, and the other not, ſo that they cannot agree; and this mutual relation may be conceived by the following lines:—

M ————————
P ——————— S ——

The queſtion now is—whether having obtained this relation, we cannot find other modes, beſides A E E. Fig. ii., in which to expreſs it.

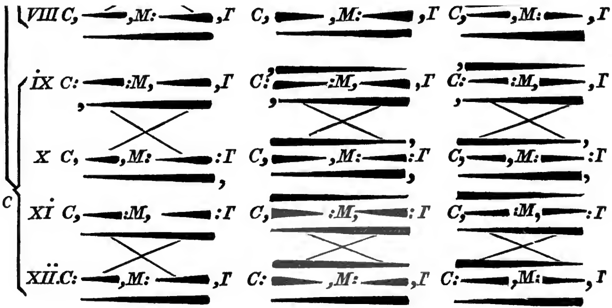
As the phyſiologiſt is moſt engaged with the parts and functions of the animal economy, to him "The nervous fluid" would be the moſt prominent term, the ſubject of thought, and therefore would very properly be the ſubject of the whole ſyllogiſm. But the *ſame* three conceptions would be the grounds for arguing.

The nervous fluid will not travel along a tied nerve.
Electricity will travel along a tied nerve.
∴ Electricity is not the nervous fluid.

This is E A E. Fig. ii. which is alſo a valid mode; and it would beſt ſuit one who was examining electricity. It is the ſame as the laſt ſtatement, except that the preſent is the converſe of the former concluſion. Again, though ſomewhat leſs naturally, we may ſtate it,

Nothing that travels along a tied nerve can be the nervous fluid,
Electricity travels along a tied nerve,
∴ Electricity cannot be the nervous fluid.

This is E A E. of the firſt Figure. From what has been ſaid we ſee that the relations between any three conceptions in our mind are permanent, that the mode of ſtatement is not permanent, but may appear now as one mode of ſyllogiſm, now as another; that the conditions which determine us to one form as more natural than another are, partly, the difference of extenſion in the conceptions, where it is aſcertainable, partly the greater prominence of one conception in



A. Balanced Middle; Unbalanced Extremes. *B*. Unbalanced Middle; Balanced Extremes.
C. Unbalanced Middle and Extremes.

our thoughts at the time, which entitles it to be the ſubject; that any one of the ſyllogiſms founded on the conceptions is ſufficient to aſcertain their relations; and that by a ſcheme of notation we may repreſent, not merely *one* of the cognate ſyllogiſms, but the ground of all of them, from which they can afterwards be drawn out ſeparately.

§ 71. *Sir William Hamilton's Scheme of Moods and Figures of Syllogiſms.*

A mode of notation propoſed by Sir William Hamilton is, beyond doubt, one of the moſt important contributions to pure Logic which has ever been made ſince the ſcience was put forth; and I am fortunate in being permitted to annex it. Its excellences are—that it is very ſimple, that it ſhows the equivalent ſyllogiſms in the different figures at a glance, that it ſhews as readily the convertible ſyllogiſms in the ſame figure, that it enables us to read each ſyllogiſm with equal facility according to extenſion and intenſion, the logical and the metaphyſical whole. Many of the different elements of the notation are not new, but the novelty lies in the completeneſs and ſimplicity of the whole ſcheme.

In this Table M denotes the middle term; and C and Γ the two terms of the concluſion. A colon (:) annexed to a term denotes that it is diſtributed, and a comma (,) that it is undiſtributed. Where the middle term has a : on the right ſide, and a , on the left, we underſtand that it is diſtributed when it is coupled in a judgment with the term on the right, and undiſtributed when coupled with the other.

The ſyllogiſms actually repreſented are all affirmatives, being twelve in each figure; and the affirmative copula is the line ◀, the thick end denoting the ſubject, and the thin the predicate, of extenſion. Thus C: ▶, M would ſignify "All C is (ſome) M." In reading off the intenſion, the thin end denotes the ſubject.

But from each affirmative can be formed two negative ſyllogiſms, by making each of the premiſſes negative in turn. The negation is expreſſed by drawing a perpendicular ſtroke through the affirmative copula; thus —┼—. In the negative modes the diſtribution of terms will remain exactly the ſame as it was in the affirmatives from which they were reſpectively formed, with ſome few exceptions in which the concluſion has a term diſtributed which was not when it was affirmative.

The line beneath the three terms is the copula of the concluſion; and in the ſecond and third figures, as there may be two concluſions indifferently, a line is alſo inſerted above, to expreſs the ſecond of them.

The mark ∽ under a mode denotes that when the premiſſes are converted; the ſyllogiſm is ſtill in the *ſame* mode.

But a ╳ between two modes ſignifies that when the premiſſes of either are converted, the ſyllogiſm paſſes into the other.

The middle is ſaid to be *balanced* when it is diſtributed in both premiſſes alike. The extremes, or terms of the concluſion are balanced, when both alike are diſtributed, unbalanced when one is and the other is not.

According to this ſcheme there are 12 affirmative Moods in each Figure, and 24 negatives, or 36 altogether. All the *poſſible* moods of ſyllogiſm are here exhibited; but the value of the inference in ſome of them is ſo ſmall that they would never actually be employed. For example, by making negative the firſt premiſs of No. vii. Fig. II. we have ſuch a ſyllogiſm as—

Some ſtones do not reſiſt the action of acids,
Some metals reſiſt the action of acids,
∴ Some metals are not *ſome* ſtones,

where there is undeniably an inference, but one which can ſcarcely be ſaid to add to our knowledge of the ſubject of it. To facilitate a compariſon of this Table with the former one (p. 255) its Moods are *tranſlated* into equivalent letters; and an examination will prove that every mood not containing the vowel η or ω,* occurs in both tables, which, after deducting the diſputed moods ſo marked, coincide in all reſpects.

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* The objections to the employment of the judgments denoted by this will be found at p. 187.

TABLE OF MODES.

	FIG. I.		FIG. II.		FIG. III.	
	Aff.	Neg.	Aff.	Neg.	Aff.	Neg.
i	U U U	E U E U E E	U U U	E U E U E E	U U U	E U E U E E
ii	A Y I	η Y ω A O ω	Y Y I	O Y ω Y O ω	A A I	η A ω A η ω
iii	U Y Y	E Y O U O O	U Y Y	E Y O U O O	U A Y	E A O U η O
iv	A U A	η U η A E η	Y U A	O U η Y E η	A U A	η U η A E η
v	U A A	E A E U η η	U A A	E A E U η η	U Y A	E Y E U O O
vi	Y U Y	O U O Y E E	A U Y	η U O A E E	Y U Y	O U O Y E E
vii	A I I	η I ω A ω ω	Y I I	O I ω Y ω ω	A I I	η I ω A ω ω
viii	I Y I	ω Y ω I O ω	I Y I	ω Y ω I O ω	I A I	ω A ω I η ω
ix	U I I	E I O U ω ω	U I I	E I O U ω ω	U I I	E I O U ω O
x	I U I	ω U ω I E η	I U I	ω U ω I E η	I U I	ω U ω I E η
xi	A A A	η A η A η η	Y A A	O A η Y η η	A Y A	η Y η A O η
xii	Y Y Y	O Y O Y O O	A Y Y	η Y O A O O	Y A Y	O A O Y η O

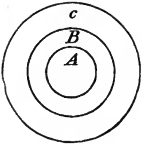
Sum of all the valid Modes in each Figure.

This Table.	Former Table.
I. 36 (= 12 aff. + 24 neg.) — 14 weak neg. =	22
II. 36 (= 12 aff. + 24 neg.) — 16 weak neg. =	20
III. 36 (= 12 aff. + 24 neg,) — 15 weak neg. =	21

§ 72. *Euler's Syſtem of Notation.*

Perhaps the moſt celebrated plan of notation is that of Euler, as deſcribed in his *Lettres à une princeſſe d'Allemagne.* But, as it only repreſents the extenſion of the terms, and not the oppoſite capacity, of intenſion, it is far inferior to that which has juſt been deſcribed. The ſphere of a conception is repreſented by a circle; an affirmative judgment by one circle wholly or partly contained in another; and a negative by two ſeparate circles. The judgment that "All men are mortal" has the effect of *including* men in the claſs of mortal beings, which would be repreſented by a ſmall circle for "men," in a large one for "mortal." The annexed diagram exhibits (I) the Mood A A A, (II) E A E, (III) A I I, and (IV) E I O, all of the firſt Figure.

1



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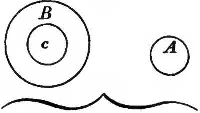

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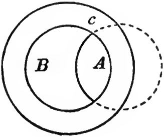

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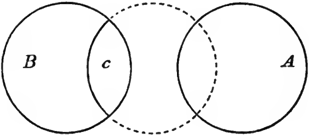

§ 73. *Inference in Extenſion and in Intenſion.*

That a judgment may be interpreted either in its extenſion or intenſion has been already ſhown (§ 48). Every ſyllogiſm has the ſame property. Thus,

All metals are luſtrous,
Iridium is a metal,
∴ It is luſtrous.

may either be read in extenſion

The claſs of metals are ſome luſtrous things,
Iridium is in the claſs of metals,
∴ Iridium is among luſtrous things.

or in intenſion

The notion of ſome luſtrous things attaches to the notion of all metals;
The notion of ſome metal is implied in Iridium
∴ The notion of ſome luſtrous thing attaches to that of Iridium.

Although any argument may be ſo expreſſed as to give the one or the other capacity greater prominence, it is at all times poſſible to read an argument in both its powers, preſerving of courſe the diſtribution of terms unchanged. The moſt important term in the extenſive point of view is the leaſt in the intenſive, becauſe it embraces moſt objects, but we know leaſt of its nature; in the example, "luſtrous" contains the other terms *under* it, and more, but "iridium" implies *in* it the notion of luſtrous and much more; "luſtrous" therefore has the greateſt extenſion, "iridium" the greateſt intenſion. Where the terms are equal, as in U U U of all Figures, extenſion and intenſion are *in æquilibrio.*

§ 74. *Conditional Syllogiſms.*

With any one of the conditional judgments deſcribed in § 41, for a firſt premiſs, and either the antecedent or conſequent of it as an abſolute aſſertion, for the ſecond, a ſyllogiſm may be formed which has the other member of the conditional for its concluſion. Thus,

> If the angle of a triangle is a rectangle, it muſt be oppoſite to the greateſt ſide.
> This angle is a rectangle,
> Therefore it is oppoſite to the greateſt ſide.

or, with the ſame conditional,

> This angle is not oppoſite to the greateſt ſide,
> Therefore it is not a rectangle.

or, with an affirmation of the conſequent for the ſecond premiſs,

If the moon comes between the earth and the ſun,
there is an eclipſe.
There is (now) an eclipſe,
Therefore the moon is between the earth and the ſun;

or, with a denial of the antecedent,

The moon is not between the ſun and the earth,
Therefore there is no eclipſe.

But, unleſs the conditional judgment expreſſes a cauſe and an effect which are coextenſive and inſeparable, or (which is the ſame thing) unleſs it can be exhibited as U, we cannot argue from a denial of the antecedent nor an affirmation of the conſequent. This is only ſaying that unleſs any conditional ſyllogiſm can be brought to one of the valid modes of ordinary ſyllogiſm, it is faulty; and there is no neceſſity to lay down freſh rules for arguments of the conditional kind, as they are governed without exception by the rules of the common ſyllogiſm.

When the conditional judgment contains but three terms, we may throw away that which is twice employed, and with the other two form our firſt premiſs (p. 167). Thus our firſt example may appear,

Every rectangle in a triangle muſt be oppoſite its greateſt ſide.
This is a rectangle in a triangle,
.·. It muſt be oppoſite its greateſt ſide;

which is in A A A. Fig. i.

When there are four terms, the manner of proceeding deſcribed above muſt be employed. Thus,

The caſe of the moon's coming between the ſun and earth, = the caſe of an eclipſe.
This is a caſe of an eclipſe,
.·. This is a caſe of the moon's coming between the ſun and the earth;

which is in U A A. Fig. ii. With theſe examples, the conditional ſyllogiſm will not, it is thought, impede our progreſs with any difficulty.

§ 75. *Disjunctive Syllogiſms.*

An argument in which there is a disjunctive judgment (p. 162) is called a disjunctive ſyllogiſm. A *pure* disjunctive argument, (i. e. one in which no immediate inference has to be ſupplied) may be at once referred to its proper mode; the disjunctive judgment being always in U. The principal formulæ of ſuch ſyllogiſms are annexed.

1. (In A U A. Fig. I.)
C D and E are B.
All A is either C, D, or E,
.·. All A is B.

2. (In E U E. Fig. I.)
Neither C nor D nor E is B.
All A is either C or D or E,
.·. A is not B.

3. (In U E E. Fig. II.)
All B is either C, D, or E.
A is neither C nor D nor E,
.·. A is not B.

4. (In E U E. Fig. II.)
B is neither C nor D nor E.
A is either C or D or E,
.·. A is not B.

From theſe forms the pure disjunctives may be eaſily underſtood. One or two concrete examples may however be given.

3. (In U E E. Fig. II.)
Every judgment is either an affirmation or negation,
A conception cannot be either an affirmation or negation,
.·. A conception is not a judgment.

(In the ſame Mode.)

A ſcience is either a pure, or an inductive, or a mixed ſcience,
Aſtrology is none of theſe,
.·. It is not a ſcience.

The complex disjunctives are founded upon the principle that if a genus is divided into ſo many ſpecies, what is in one of the ſpecies cannot be in another (§ 58). In bringing them to the form of common ſyllogiſms, we are to take away the disjunctive judgment and put in its place a judgment immediately inferable from it. Thus,

All A is B or C.
This A is not B,
.·. It is C;

would become

[All A is B or C, therefore]
All (A that is not B) is C.
This is an (A that is not B),
.·. This is C.

All ſciences are either pure, inductive, or mixed ſciences.
Aſtronomy is not a pure nor an inductive ſcience,
.·. It is a mixed ſcience;

would ſtand as a ſyllogiſm in A A A. Fig i.

Sciences that are not pure nor inductive are mixed.

Aſtronomy is a ſcience that is not pure nor inductive,
∴ It is a mixed ſcience.

§ 76. *The ſo-called Inductive Syllogiſm.*

Induction is the proceſs of reaſoning from particulars to univerſals—from the judgment that ſome mark belongs to ſeveral parts of a claſs to the judgment that it belongs to the whole claſs. All reaſoning from particular facts to general laws is inductive, into whatever mode of ſyllogiſm it may fall; and we ſhall find that in the various ſteps, introductory, collateral and direct, various modes are needed. The canon of the induction by ſimple enumeration—what is true of all the parts of a conception is true of the whole—only applies to one act of the proceſs; and the mode which beſt exemplifies it is the ſame as the firſt disjunctive ſyllogiſm given in the laſt ſection, except that the ſecond premiſs is converted, and ſo becomes a copulative inſtead of a disjunctive judgment.

C, D and E are B,
C, D and E = A,
∴ All A is B.

This is in A U A. Fig. iii. It would give a *complete* induction, i. e. one in which every one of the particular caſes is brought in, ſo that we may be certain *a priori* that a given property belongs to the whole. But it is evident that if an examination of every caſe were requiſite, before we were at liberty to ſtate a law, the ſciences properly called inductive, thoſe which lay down the laws that govern the univerſe, could never have exiſted. Human obſervation is inſufficient for the taſk of collecting every ſingle caſe which a law does govern or has governed. Hence we muſt be ſatisfied with an enumeration of caſes leſs than the whole, which is termed incomplete Induction. But no concluſion can be ſtronger than its own grounds, and if in the premiſs we have only ſpoken of *ſome* caſes, we have no right to ſpeak of *all* in the concluſion, unleſs we can ſhow that the caſes we have ſelected are a ſufficient ſample of all—that what we have brought in are really as good as all. This muſt be done by an argument independent of the inductive ſyllogiſm itſelf, as by arguing that the laws of nature are uniform, and that therefore what we find to prevail in ſeveral caſes we may believe to be invariable.

Hence no incomplete induction can be exhibited as a ſingle ſyllogiſm, whereas a complete one can. Where the incomplete induction is ſufficient, and upon what condition its ſufficiency depends, are among the principal queſtions which *applied* Logic has to anſwer; and it muſt ſhow at the ſame time how many proceſſes belong to Induction beſides the method of ſimple enumeration that uſually monopolizes the name.

§ 77. *Complex Syllogiſms. Sorites.*

The ſimple ſyllogiſm is the type of all reaſoning, and the teſt to which all reaſoning may be brought. But there are more complex forms of argument, not leſs natural than the ſyllogiſm itſelf, which do not *require* to be reduced to ſyllogiſms to ſhow their correctneſs, juſt as we know ice to be ice without reducing it to the needle-ſhaped cryſtals with which freezing commences. Of this kind is the Sorites.

Three or more premiſſes in which the predicate of each is the ſubject of the next, with a concluſion formed from the firſt ſubject and laſt predicate of the premiſſes, have been called a Sorites, or accumulating argument—from the Greek word σωρὸς, a heap. The name is not very appropriate; the German title of chain-argument (*kettenſchluſs*) expreſſes better the nature of a proceſs in which the mind goes on from link to link in its reaſoning, without thinking it neceſſary to draw out the concluſions as it paſſes. Where the premiſſes are all univerſal affirmative attributive judgments, not the leaſt confuſion can ariſe from thus poſtponing till the end the realization of the reſults. But where the premiſſes are judgments of different kinds, the reaſoning is more difficult to follow, and it may be neceſſary to draw out each ſyllogiſm ſeparately, in order to ſee whether it is in a valid mood, and, if otherwiſe, what is the fault in it. This is done as follows.

All the premiſſes but the firſt are leading premiſſes of ſo many diſtinct ſyllogiſms; therefore there are as many ſyllogiſms, minus one, as the Sorites has premiſſes. For the ſecond premiſs of the firſt ſyllogiſm the firſt judgment of the Sorites muſt be taken;

whilſt to each ſucceeding one the concluſion of its predeceſſor muſt be the ſecond premiſs. A diagram will make this much clearer.

1. A is B,
2. B is C,
3. C is D,
4. D is E,
Therefore A. is E.

Reduced to

I.	II.
2. B is C,	3. C is D,
1. A is B,	[A is C],
[∴ A is C],	[∴ A is D],

III.
4. D is E,
[A is D],
∴ A is E.

Theſe ſyllogiſms are all in A A A. Fig. 1. a valid mode. An invalid mode occurring before the laſt ſyllogiſm would not only be wrong itſelf, but, as furniſhing a premiſs to its ſucceſſors, would vitiate every ſyllogiſm that follows.

The number of concluſions which theſe premiſſes admit of, is greater than actually appears. We may conclude A C, A D, A E (which appear;) and B D, B E, C E. Five premiſſes inſtead of four would increaſe the number of concluſions to ten.* There is a form of the Sorites to which the name of Goclenius its inventor has been attached, which is the ſame as the common form, except that the premiſſes are reverſed. It would run

D is E,
C is D,
B is C,
A is B,
∴ A is E.

In the Goclenian Sorites extenſion is made more prominent by ſtarting with the premiſs which has the two wideſt terms; in the common form intenſion predominates, as the narrower terms precede. The former deſcends in extenſion from the predicate of the concluſion; the latter aſcends, in intenſion, from the ſubject.

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* Com. *Ariſt.* Pri. An. I. 25. The formula for aſcertaining the number of concluſions is this.

Let the number of premiſſes $= n$, the number of terms $= n + 1$; then the number of concluſions $= \frac{n(n-1)}{1 \cdot 2}$

In the following example a mixed order prevails:—

That which thinks, is active,
That which is active has ſtrength,
That which has ſtrength is ſubſtance.
The ſoul thinks,
Therefore it is ſubſtance.

§ 78. *The Dilemma.*

The Dilemma is a complex argument, partaking both of the conditional and disjunctive argument. It is a ſyllogiſm with a conditional premiſs, in which either the antecedent or conſequent is disjunctive. It may prove a negative or an affirmative; in the former caſe it is ſaid to be in the mode of removal (*modus tollens*) becauſe it removes or refutes ſome concluſion that has been propoſed for proof; in the latter, it is in the mode of poſition (*modus ponens*) becauſe the propoſed queſtion is *laid down* as proved. The following forms of it, with the manner in which they are preſented as ſyllogiſms, may be ſufficient.

I.

If A is B or E is F, then C is D.
But either A is B or E is F,
∴ C is D.

II.

If A is B, then C is D or E is F.
But neither C is D nor E is F,
∴ A is not B.

III.

If ſome A is B, either the m that are A or the n that are B.
But neither the m that are A nor the n that are A are B,
∴ A is not B.

The ſame regarded as ſimple ſyllogiſms.

I.

[The caſes of A being B and E being F] are [caſes of C being D].
This is [a caſe of A being B or E being F],
∴ This is [a caſe of C being D].

II.

[The caſe of A being B] is [a caſe of C being D or E being F].
This is not [a caſe of C being D or E being F],
∴ This is not [a caſe of A being B].

III.

Neither m of A nor n of A are B.
All A is either m or n,
∴ No A is B.

The word Dilemma means "double propoſition," ſo that the whole argument takes its name from the one mixed judgment in it. When this is *more* than double, as in "If a priſoner is legally diſcharged, either the magiſtrate muſt refuſe to commit, or the grand jury ignore the bill, or the common jury acquit, or the crown exerciſe the prerogative of pardon," the argument has been called a Trilemma, Tetralemma, or Polylemma according to the number of members the judgment may have. The popular notion of a Dilemma, that it is a choice of alternatives, each of them fatal to the cauſe or the character of an adverſary, is countenanced by many logicians, but can have no place in pure Logic, into which the object to be gained by arguments, or the perſonal conſequences which follow from admitting them, ought not to enter, and the properties of the arguments themſelves are the ſole object of conſideration.

If the criminal knew the conſequences of his act, he was wicked; if he did not know the conſequences, he was inſane.

This is really two diſtinct hypothetical judgments, aſſociated becauſe they happen to have a common term—" the criminal;" and becauſe one or other of them muſt be true; and two diſtinct ſyllogiſms would be founded upon them, as the counſel for the defence would probably take for his ſecond premiſs—" He did not know the conſequences of his act, therefore he is inſane," whilſt the counſel for the proſecution would maintain that " He did know the conſequences, and therefore was guilty." No doubt it is a great detriment to a priſoner to be found either guilty or inſane, but this does not appear upon the face of the argument, and therefore pure Logic does not take it into account. A new judgment would be required to ſhow the connexion of the two notions; ſo that beſides the two conditional ſyllogiſms contained in the argument itſelf, a third is tacitly admitted, that ſhews the connexion of the other two. The view of the Dilemma taken by the Wolfian ſchool, has therefore been adopted inſtead of the popular notion.

§ 79. *Incomplete Syllogiſms.*

The arguments uſed in thinking, ſpeaking or writing are never drawn out in ſtrict technical form, except by practiſed logicians, deſirous of exhibiting their art to thoſe who, like themſelves, are converſant with it. A ſentence which contains the materials of a ſyllogiſm, not technically expreſſed, has been called an enthymeme, or an enthymematic ſentence. Ariſtotle underſtands by enthymeme a ſyllogiſm ſuch as would be uſed in rhetoric, where the full and orderly expreſſion of premiſſes and concluſion would ſeem laboured and artificial. And as the omiſſion of one of the premiſſes is a common, perhaps the commoneſt, feature of enthymemes, logicians have defined them as ſyllogiſms with one premiſs ſuppreſt. But we may alſo omit the concluſion, or invert the order of premiſſes and concluſion; and unleſs we extend the name enthymeme to theſe caſes, we put a conſiderable reſtriction upon its original meaning. Let the enthymeme then be defined—an argument in the form in which it would naturally occur in thought or ſpeech.

§ 80. *Proſyllogiſm and Epiſyllogiſm.*

In a chain of reaſoning, one of the premiſſes of the main argument may be the concluſion of another argument, in that caſe called a proſyllogiſm: or the concluſion of the main argument may be a premiſs to a ſupplementary one, which is called an epiſyllogiſm. Let us take the ſyllogiſm which a coroner's jury might have to go through. The *queſtion* is "Has A. B. been poiſoned?" and the ſyllogiſm is "A man who has taken a large quantity of arſenic has been poiſoned, and A. B. is found to have done ſo, therefore he has been poiſoned;" with the addition of a proſyllogiſm and epiſyllogiſm the reaſoning would run—"A man who has taken arſenic has been poiſoned; and A. B. has taken arſenic, for the application of Marſh's and Reinſch's teſts diſcover it (Proſyl.); therefore A. B. has been poiſoned, and therefore we cannot return a verdict of death from natural cauſes. (Epiſyl.)

OUTLINE OF THE LAWS OF THOUGHT.

PART IV.

APPLIED LOGIC.

"Mais, parce que l'eſprit ſe laiſſe quelquefois abuſer par de fauſſes lueurs, lorſqu'il n'y apporte pas l'attention néceſſaire, et qu'il y a bien des choſes que l'on ne connaît que par un long et difficile examen, il eſt certain qu'il ſerait utile d'avoir des règles pour ſ'y conduire de telle ſorte, que la recherche de la vérité en fût et plus facile et plus ſûre ; et ces règles, ſans doute, ne ſont pas impoſſibles." ARNAULD.

APPLIED LOGIC.

§ 81. *Logical Truth.*

INDEPENDENT of the truth which conſiſts in the conformity of thoughts to things, called ſcientific,—and of that which lies in the correſpondence of words with thoughts, called moral truth,—there is a truth called logical, depending on the ſelf conſiſtency of thoughts themſelves. The rules of pure logic ſeek to eſtabliſh this and this only: they afford no criterion for deciding that obſervations made on external nature are correct, or moral or theological principles are truly laid down; but they attempt to furniſh criteria for comparing our thoughts with one another, and for deciding that they are mutually conſonant or diſſonant. Four teſts of this kind have been diſcovered, and in different forms advocated by logicians.

1ſt. CRITERION. *The principle of contradiction.* "The ſame attribute cannot be at the ſame time affirmed and denied at the ſame time of the ſame ſubject." To illuſtrate this—at a particular era in the hiſtory of Aſtronomy, it was believed that the portions of a planet's orbit actually obſerved were parts of a circle, and in conſequence the erroneous theory was adopted that the planetary orbits are circular. Now if an aſtronomer had, upon theſe obſervations, enounced that the orbits were *elliptic*, he would have come more near the true ſtate of the caſe, as diſcovered by later and more accurate obſervations; but he would have violated the fundamental principle of contradiction, in thinking that the planet had an orbit whoſe *parts* were parts of a circle, at the ſame time that the whole of the orbit was an ellipſe. From our conceptions of a circle and an ellipſe we know that to ſay a thing is a circle as well as an ellipſe, is to ſay that it is and is not a circle at the ſame time. In obedience to the law of contradiction, where obſervations are at variance with a theory, or ſome caſe ſeems to violate a law that ought to operate in it, we are bound either by reviſing the theory and the law ſo as to take in the obſervations, or by correcting the obſervations till they comply with the theory, to bring our thoughts into ſelf-conſiſtency; as was indeed actually done from time to time in aſtronomy, when the phenomena were found not to agree with the theory of circular revolutions, by the addition of epicycles, and the final ſubſtitution of the elliptic theory.

2d CRITERION. *The principle of identity.* "Conceptions which agree can be in thought united, or affirmed of the ſame ſubject at the ſame time." This principle is the complement of the former.

3d CRITERION. *The principle of the middle being excluded,* (lex excluſi medii.) "Either a given judgment muſt be true of any ſubject, or its contradictory; there is no middle courſe." So that if we think a judgment true, we muſt abandon its contradictory; if falſe, the contradictory muſt be accepted. This law alſo applies to the dialectical contrivance known to logicians as *reductio per impoſſibile*.

4th CRITERION. *The principle of ſufficient reaſon.* "Every judgment we accept muſt reſt upon a ſufficient ground or reaſon." From this law follow ſuch principles as theſe. I. Granting the reaſon, we muſt grant what follows from it. On this ſyllogiſtic inference depends. II. If all the conſequents are held to be true, the reaſon muſt be true. III. If we reject the conſequent, we muſt reject the reaſon. IV. If we admit the conſequent, we do not of neceſſity admit the reaſon, as there may be other reaſons or cauſes for the ſame effect.

Theſe teſts, in the mode in which they are here ſtated, apply only to *logical* truth. They may be employed to bring our thoughts into harmony with each other, but are wholly inadequate to aſcertain whether our thoughts accurately repreſent the world around us. They belong to pure Logic alone.

§ 82. *Objective, or Metaphyſical Truth.*

But all men believe that their intellectual powers are capable of far greater things than the preſervation of ſelf-conſiſtency in thinking. Thought is valueleſs to them except in ſo far as it leads to correct knowledge of things; a higher truth than the merely logical, in ſubſervience to which alone the logical is deſirable. The reaſon that we ſeduloufly avoid the purely logical error of holding two contradictory propoſitions is that we believe one of them to be a fair repreſentation of facts, ſo that in accepting the other we ſhould admit a falſehood, which is always abhorrent to the mind. If we call the logical truth, ſubjective, as conſiſting in the due direction of the thinking ſubject, we may call this higher metaphyſical truth, objective, becauſe it depends on our thoughts fairly repreſenting the *objects* that give riſe to them.

Every one believes that he knows what truth is; and perhaps if we were to define it as a right knowledge of the nature and cauſes of things, we ſhould find many to accept the explanation of its meaning. Yet in reality the greateſt difference of opinion prevails upon this ſubject. To conſtitute truth and knowledge, two elements muſt be preſuppoſed, a perſon who thinks, and a thing or object about which he thinks; whether the latter is entirely independent of him, or is part of himſelf, as when he reflects on his own ſtate of mind, and thus becomes his own object.

But the notions conceived of things are ſubject to variation; what appears good at one time is found to be evil at another; what appears great in relation to one object is ſmall in compariſon with another. As man is always earneſtly ſtriving to conquer theſe variations and to ſee things as they are, free from the tints of his own mind, he is led to the belief that there muſt be an Abſolute, Eternal Mind, not ſubject to theſe changes of ſtate, and therefore able to ſee the very nature of things, and to know what is permanent and good and right in a world which is full of change and of mixed good and evil.

Theſe are the elements, I think, of which an honeſt, intelligent perſon, without any particular philoſophic bias, would find his thoughts to be compoſed. But doubts may be raiſed upon any of the three elements. "There is no abſolute ſtandard of truth," it may be ſaid. "What we think true or good, *is* ſo. The greateſt crime might become right and laudable, if all mankind agreed to award praiſe to it. The opinion of man is the rule of truth." Or again (by one who was diſpoſed to deny the exiſtence of the object) "How do you prove that there is an external world? Impreſſions upon your mind can only prove that the mind is impreſſed; you have no right to infer any thing as to the nature of the things which make them. The ſky overhead, and all the ſtars that look unſteadily upon you from its purple depth, are not what you think, but are a mere impreſſion which God wills that you ſhall receive." Or a more ſubtle ſcepticiſm ſtill may urge that one's own exiſtence cannot be proved but by arguments which aſſume it, and ſo beg the queſtion.

Thus the famous *cogito, ergo ſum* of Deſcartes has been forced into the ſyllogiſm *Si ſum, ſum; Sum autem; Sum igitur.* But leaving theſe metaphyſical enquiries, let us aſſume the fact of our perſonal exiſtence, which forces itſelf upon our belief from the moment we begin to think; and the fact of the exiſtence of created ſubſtances, which alſo forces itſelf upon us when we take note of their different qualities; and laſtly, the fact of the exiſtence of ſomething eternal and unchangeable, which is alſo inferred from the mutual operation of the other two. And let us further notice that theſe three fundamental elements are removed from our *direct* cognizance. Conſciouſneſs—the exiſtence of all that we mean by "I"—is only to be ſeen in its effects, in the modes in which things around us act upon it; ſubſtance can only be known in its attributes; and as for the Eternal, "No man hath ſeen him at any time," and (independently of revelation) he can only be known by that peculiar power of reaſon, of finding a privative idea from a poſitive, the infinite from the finite, the immutable from the mutable, the eternal from the contemplation of things which endure but for a day.

Applied Logic has to explain how the mind proceeds in the attainment of objective or metaphyſical truth, in as far as this can be done by laying down univerſal principles, and not ſuch as are confined in their application to any one or two ſciences. It muſt alſo ſhow that the rules of pure Logic are actually employed in the diſcovery of truth, and how far they are modified by the neceſſities of our poſition with regard to the objects of reſearch.

§ 83. *Belief, and degrees of Belief.*

In forming any judgment we cannot avoid attaching to it a particular degree of credence, which might be, and often is, expreſſed by the inſertion of ſome adverb to qualify the copula; thus “ To-morrow will (poſſibly) be fine,” and “ Two ſtraight lines (indiſputably) cannot encloſe a ſpace.” Although one of theſe judgments admits a degree of doubt, which the other excludes, the difference lies in our knowledge of the things ſpoken of rather than in the things themſelves. To-morrow will be fine or will be ſtormy, and it is fixed by the decree of nature which ſhall happen; but *to us* the matter is purely doubtful, becauſe we cannot ſee into the order of nature as to this particular. Doubtful ſtatements may become certain, without any alteration in the facts to which they relate, by changes in our knowledge. A child ſees with wonder a lunar eclipſe, and thinks that *poſſibly* another may happen to-morrow; when he has learnt Aſtronomy he may be able to ſay from exact calculations, upon what day one may poſitively be expected. Yet here the order of things remains the ſame. The amount of belief which we have in our judgment has been called its Modality, as being the *mode* in which we hold it for truth. Arranging the degrees of Modality in an aſcending ſcale, we find that a judgment may be

1. Poſſible, where upon the firſt view we have no cauſe to think that the predicate may not be truly ſaid of the ſubject, but

have not examined. Does this amount to a judgment? or is it the ſtep which muſt precede the formation of the weakeſt kind of judgment?

2. Doubtful, where we have teſted it in ſome caſes, and found that ſome ſeem to confirm it, whilſt ſome are doubtful.

3. Probable, where all the trials we have made are favourable, but the number of them is not ſufficient to warrant certainty.

4. Morally certain for the thinker himſelf; where from examination of the matter, or prejudice, or intereſt, he has formed his own belief, but cannot put forward ſufficient grounds for it, ſo as to control that of others.

5. Morally certain for a claſs or ſchool; where the judgment reſts upon grounds which are ſufficient for all men of the ſame habits of thought, or the ſame education as the thinker.

6. Morally certain for all; as for example the belief that there is a future ſtate, which though not abſolutely demonſtrable, reſts upon ſuch grounds that it ought to influence the conduct (*mores*) of every man.

7. Phyſically certain, with a limit. For example, the aſtronomical law called "Bode's law of diſtances," which has (I believe) a cloſe approximation to the truth, admits ſome exceptions that may hereafter open to us another higher law to abſorb and ſuperſede it.

8. Mathematically certain; where doubt cannot be admitted. *Ex. gr.* the axiom—Two ſtraight lines cannot encloſe a ſpace, or the theorem—The angles at the baſe of an iſoſceles triangle are equal.

All theſe degrees of belief may, upon a broader principle of diviſion, be reſolved into three.

Our judgments, according to Ariſtotle, are either problematical, aſſertive, or demonſtrable; or in other words, the reſults of Opinion, of Belief, or of Science.

The problematical judgment is neither ſubjectively nor objectively true, that is, it is neither held with entire certainty by the thinking ſubject, nor can we ſhow that it truly repreſents the object about which we judge. It is a mere opinion. It may however be the expreſſion of our preſentiment of certainty; and what was held as mere opinion before proof, may afterwards be proved to demonſtration. Great diſcoveries are problems at firſt, and the examination of them leads to a conviction of their truth, as it has done to the abandonment of many falſe opinions. In other ſubjects we cannot from the nature of the caſe advance beyond mere opinion. Whenever we judge about variable things, as the future actions of men, the beſt courſe of conduct for ourſelves under doubtful circumſtances, hiſtorical facts about which there is conflicting teſtimony, we can but form a problematical judgment, and muſt admit the poſſibility of error at the moment of making our deciſion.

The aſſertive judgment is one of which we are fully perſuaded ourſelves, but cannot give grounds for our belief that ſhall compel men in general to coincide with us. It is therefore ſubjectively, but not objectively certain. It commends itſelf to our moral nature, and in ſo far as other men are of the ſame diſpoſition, they will accept it likewiſe.

The demonſtrative judgment is both ſubjectively and objectively true. It may either be certain in itſelf, as a mathematical axiom is, or capable of proof by means of other judgments, as the theorems of mathematics and the laws of phyſical ſcience.

§ 84. *Anticipation.*

Events occur in a certain order, and thoſe which are uſually ſaid to depend upon chance are doubtful only *to us.* The iſſue of a horſe race that ſhall take place next year, depends upon the ſuperior phyſical qualifications of a certain horſe, the mode in which he is treated in the interim, and the honeſty with which his owner and rider make uſe of his ſtrength and ſpeed in the conteſt; and we are only uncertain becauſe we cannot ſee theſe cauſes and aſcertain how far they will operate. Now the mind is anxious to penetrate into the uncertain, and make it clear and evident. We cannot be content with knowing that "*perhaps* the earth revolves round the ſun," and "*perhaps* the preparations of arſenic are all poiſonous;"

an eternal impulſe of our nature prompts us to ſeek for certainty out of the variable and contingent, for univerſal laws and rules out of particular caſes. The more exactly to appreciate the power of this impulſe, let us conceive the condition of a being not endowed with it. Suppoſe that a mind could exiſt with no power of knowing any thing beyond the facts actually ſubmitted to the eyes, but with full power to record and "regiſter" theſe. What would be his ſurpriſe to hear us dealing in general ſtatements! "You ſay that all men are mortal," he might exclaim, "but for my part I have no cognizance of the actual mortality of more than two or three thouſand people at the moſt: nor can you poſſibly predict that the two hundred millions of men now alive will periſh without exception; ſo that your ſtatement is raſh and unwarrantable." And yet we do not fear to truſt ourſelves to ſtatements of the higheſt generality;—"Every unſupported body will fall to the ground." "All organized matter muſt ſuffer decompoſition." "The angles of every triangle are equal to two right angles." Whatever be our juſtification for a procedure apparently ſo precipitate, in many ſubjects we do not heſitate from two or three caſes of a given property to infer at once that it will be found in *all* like caſes; when, for example, we obſerve two or three times that a ſtone dropped from the maſt of a ſhip in motion falls at the foot of the maſt and not behind it, we find in theſe few trials full evidence (*fulgor quidam, mentis aſſenſum rapiens*) of the operation of ſome general law, and deſiſt from our experiments with the conviction that if they were a thouſand times repeated, the reſult would be invariably the ſame. We do not indeed omit to aſcertain the reaſon of the reſult we have obtained, and ſhould endeavour to find among the known mechanical laws ſome that would explain it: and if it proved inconſiſtent with any law of the truth of which we were already convinced, probably we ſhould ſuſpect the accuracy of our obſervations, and ſeek occaſion to repeat them with a view to their rectification. But ſtill we ſhould be pretty certain to haſten to a general ſtatement, believed at firſt with heſitation, but after many trials with certainty, from a number of caſes wholly inſufficient in themſelves to warrant it. This power of divination, this ſagacity, which is the mother of all ſcience, we may call Anticipation. The intellect, with a doglike inſtinct, will not hunt until it has found the ſcent. It muſt have ſome preſage of the reſult before it will turn its energies to its attainment.

The ſyſtem of anatomy which has immortalized the name of Oken, is the conſequence of a flaſh of anticipation which glanced through his mind when he picked up, in a chance walk, the ſkull of a deer, bleached by the weather, and exclaimed after a glance, "It is a vertebral column!" When Newton ſaw the apple fall, the anticipatory queſtion flaſhed into his mind "why do not the heavenly bodies fall like this apple?" In neither caſe had accident any important ſhare; Newton and Oken were both prepared by the deepeſt previous ſtudy to ſeize upon the unimportant fact offered to them, and ſhow how important it might become; and if the apple and the deer's ſkull had been wanting, ſome other falling body, or ſome other ſkull would have touched the ſtring ſo ready to vibrate. But in each caſe there was a great ſtep of anticipation; Oken thought he ſaw the type of the whole ſkeleton in the ſingle vertebra and its modifications, whilſt Newton conceived at once that the whole univerſe was full of bodies tending to fall; two truths that can ſcarcely be ſaid to be contained in the little occurrences in connection with which they were firſt ſuggeſted.

A miſtaken notion prevails that this rapid anticipation does not belong to the philoſophic caſt of mind—that it is preciſely what Bacon condemns as the method which "hurries on rapidly from the particulars ſupplied by the ſenſes to the moſt general axioms, and from them as principles, and their ſuppoſed indiſputable truth, derives and diſcovers the intermediate axioms." It is thought that caution, and deliberate examination of every particular we can find, before we allow ourſelves to form any concluſion whatever, are the conditions of all ſound phyſical enquiry. There is here a confuſion of two diſtinct things. Scrupulous caution ſhould be exerciſed before an hypotheſis is conſidered to be *proved;* and the law that we believe to be true ſhould be applied to every fact where it can be ſuppoſed to operate, and to every other law with which it might interfere, in order to verify exactly what was at firſt only a happy conjecture. Bacon meant to complain that this ſober proceſs did not always follow the bright thought and brilliant ſuggeſtion; and perhaps that the bright thought itſelf was not ſuggeſted in the region of facts but in that of words. When the ancient Aſtronomy, ruſhing to the general axiom that "the circular motion is the moſt perfect," deduced from it the intermediate axiom that the motion of the heavenly bodies muſt be the circular, it might be reaſonably charged with undue uſe of anticipation; becauſe the higheſt axiom, having no preciſe and definable meaning, cannot have really ſprung from the contemplation of any facts, nor do it and the axiom drawn from it, ſquare with the facts they pretend to embrace. Where theſe conditions are obeyed, Anticipation is, as we have called it, the mother of ſcience. "To try wrong gueſſes" ſays Dr. Whewell, "is, with moſt perſons, the only way to hit upon right ones. The character of the true philoſopher is, not that he never conjectures hazardouſly, but that his conjectures are clearly conceived, and brought into rigid contact with facts. He ſees and compares diſtinctly the ideas and the things; —the relation of his notions to each other and to phenomena. Under theſe conditions, it is not only excuſable, but neceſſary for him, to ſnatch at every ſemblance of general rule, —to try all promiſing forms of ſimplicity and ſymmetry." Anticipation then is the power whereby the mind preſages a truth before it is fairly proved, before ſhe makes the attempt to eſtabliſh it by exact and cautious methods. Philoſophy proceeds upon a ſyſtem of credit; if ſhe never advanced beyond her tangible capital, her wealth would not be ſo enormous as it is. She works with a principle as true before ſhe knows it to be ſo, becauſe in watching how it operates upon facts, conſiſts the beſt means of eſtabliſhing its truth; but ſhe muſt be prepared at the ſame time to abandon and diſmiſs it whenever it is found to be in direct and irreconcileable conflict with eſtabliſhed facts.

§ 85. *Analyſis and Syntheſis.*

There are two oppoſite, but correlative, modes of procedure in inveſtigating truth, Analyſis and Syntheſis. Analyſis is the reſolution of any whole into its parts; Syntheſis is the compoſition of any whole by bringing its parts together.

Logical analyſis may be illuſtrated by the analogous proceſs in Chemiſtry, in which tangible or viſible ſubſtances are decompoſed into their elements. The beautiful ſtone called Lapis-lazuli is employed in the manufacture of ultra-marine-blue; but from its ſcarcity the colour long bore a high price and was ſparingly employed in the arts. The Chemiſt found that the components of the ſtone were ſilica, alumina, ſoda, ſulphur, and a trace of iron. Naturally the queſtion, ſo ſucceſsfully applied to other caſes by the chemiſt every day, was aſked—can we not by ſyntheſis, by throwing together the ſame proportions of thoſe five ſubſtances under proper conditions, manufacture lapis-lazuli? but in this caſe ſome doubts were felt as to the anſwer, becauſe the elements as given by the analyſis ſeemed inadequate to account for its rare colour.

But perfect ſucceſs attended the attempt; and ultra-marine manufactured by this artificial proceſs, is now employed for purpoſes to which, on account of the extravagant price it bore, the lapis-lazuli could never be applied. In this inſtance the ſynthetic proceſs was rewarded by conſiderable profit, and by the poſſeſſion of a beautiful pigment, in quantities limited only by the will of the producer, which could not be obtained before except in ſmall quantities at an enormous price.

We are only concerned with the mental proceſs which accompanies theſe acts of analyſis and ſyntheſis; and we notice in the firſt place that they were ſuggeſted by an act of ſimple converſion (§ 53)—" Ultra-marine is ſilica, alumina, ſoda, ſulphur and iron in certain proportions; therefore ſilica, alumina, ſoda, ſulphur and iron brought together in certain proportions are ultra-marine." To achieve the ſeparation in the firſt inſtance and the union in the ſecond, many difficult and delicate operations were requiſite, and many ſyllogiſtic acts would ſuggeſt or accompany them; for example (to prove that iron was preſent) one ſyllogiſm might be "What gives a blue precipitate on the addition of ferrocyanide of potaſh, contains iron; now a certain ſolution of lapis-lazuli does this; Therefore it contains iron." But the *reſult* of the analyſis may be ſimply converted into the reſult of the ſyntheſis, and the latter is the "immediate conſequent" of the former (p. 215); ſo that the proceſs may be referred to an appropriate place in pure Logic. Further it is to be noticed that, in this caſe at leaſt, the ſyntheſis could not have been performed unleſs the analyſis had preceded. It is very true that in the many admixtures of various ſubſtances which the chemiſt has occaſion to make, the five components of ultra-marine might have been thrown together by accident; and indeed in 1710 the colour in queſtion was produced by chance, in a furnace uſed for the manufacture of an alkali, before the ſyntheſis had been intentionally effected. But ſuch an accident gives us no power to repeat the combination at will; either we muſt remember what the various ſubſtances we threw together were, which produced ſo ſtriking a reſult,—and this is a kind of analyſis; or, taking the product, we muſt by painful proceſſes ſuggeſted by chemiſtry aſcertain preciſely what it contains; if we would conſtruct a formula to enable ourſelves and others to obtain the ſame product at will. Again, we may obſerve that, for a perfect knowledge of the chemical compoſition of ultra-marine, the analyſis juſt deſcribed is not ſufficient; that an inventive mind would go on to inquire in which of the components the brilliant colour reſided, whether in one or two or all of them together; and he would find, probably after another careful inveſtigation, that ſulphuret of ſodium was the baſis of it.

And further, we may notice that ſagacity, or the power of anticipation, contributed a large ſhare of the ſucceſs which attended the analyſis. The labour of teſting any unknown ſubſtance would be infinite, as it would involve the application of teſts for every known element in the univerſe, were it not for the power we uſe ſo freely, of conjecturing what components are moſt likely to occur; which gives a ſagacious chemiſt an immenſe advantage over a leſs acute competitor, in deviſing new and ſuitable means to detect the ingredients with clearneſs and certainty.

So far we have only obſerved the proceſs of the mind when a ſubſtance is to be analyſed into its elements; let us take an example of a not leſs important kind, where a known effect is to be traced to its cauſes. Our reſult in the preceding caſe would be expreſſed by a categorical judgment; in that which follows, by a hypothetical. We ſhall be content, as before, with a rough ſtatement, leaving the more careful examination of the proceſs for another ſection. When a ſhot is fired from a cannon directed horizontally, it does not preſerve the horizontal direction impreſſed upon it, but deſcribing a particular curve, it finally comes to the ground. Now the artillery-man deſires to be able to predict at what point the curved path of a given ſhot he is about to deliver, will terminate. He might do this in a rude and inaccurate manner by pointing the gun horizontally as before, and uſing the ſame kind of ball with the ſame quantity of powder; or even, after a great number of experiments, acquire the *tact* which the ſportſman poſſeſſes, of directing his piece aright, without being able to account for his own exactneſs. But experiments on ſo large a ſcale are waſteful and troubleſome; and if by analyſing the laws which the cannon ſhot obeys, we can, ſynthetically, compel it to deſcribe the ſame courſe, we ſhall be able at leaſt to diminiſh the number of the experiments, though, for reaſons we ſhall ſoon mention, they can never be diſpenſed with entirely. The principal laws are diſcovered to be theſe—the law of gravitation, deflecting the ſhot from the horizontal, and finally bringing it to the ground—the law of momentum, impelling it forward from the cannon—and the law of atmoſpheric reſiſtance. In ſo far then as we can determine the momentum which a given weight of powder will communicate to a ball, the reſiſtance which the air will oppoſe to it, and the invariable force of gravitation acting in conjunction with the two variable forces, we ſhall be able to predict the courſe of a cannon-ball, though it has never yet fulfilled its miſſion of deſtruction; allowing, however, for ſome ſources of error not yet mentioned. I ſay "in ſo far," becauſe it is more difficult and as neceſſary to determine the *amount* of operation of the ſeveral cauſes, as to aſcertain the cauſes themſelves. The reſiſtance of the air was once regarded as an unimportant element in determining the cannon-ball's flight; but it has ſince been ſtated that the reſiſtance to a muſket ball at the moment it leaves the barrel is equal to 120 times the weight of the ball, and in a certain direction of the piece, reduces its range to half a mile, though, if this cauſe did not operate, it would deſcribe a parabola, it is calculated, of 17 miles. There is a further difficulty, fruitful of errors, that of aſcertaining *all* the cauſes which concur to produce an effect; for it often happens that ſome leſs prominent parts of the complex fact are overlooked, or attributed to the obvious cauſes, when they really have a hidden cauſe of their own, that ought to be aſcertained. Thus the calculations about projectiles are diſturbed by what is called the *windage*, or the ſtriking of a ball that does not quite fill the barrel, now againſt one part of it and now againſt another, which affects its courſe materially after it has left the mouth. Since the diſcovery of this operating cauſe, means have been taken to obviate it, by rifling the barrel, or ſlightly contracting it above the charge, and with ſome ſucceſs. But other diſturbing cauſes, not wholly removable, exiſt in the varying ſtrength and exploſiveneſs of the powder, the form and material of the bullet, and the motion of the wind added to the mere paſſive reſiſtance of the atmoſphere. In this caſe then, a perfectly accurate analyſis is unattainable, and by conſequence a perfect ſyntheſis. The reſult of each train in the analyſis is a hypothetical judgment; and that of the whole, a compound hypothetical formed from all the ſimple forms. Thus,

1. If a body is left unſupported, it is attracted to the earth at the rate *m*.
2. If a quantity, *n*, of powder is exploded in a gun, a ball of *o* weight is propelled to the diſtance *p*.
3. If the reſiſtance of air amounts to *q*, it will reduce the range of a ball by the length *r*.

Repreſenting theſe judgments by letters, we may exhibit the inference thus,

1. If A is preſent, X muſt occur.
2. If B is preſent, Y occurs.
3. If C is preſent, Z muſt occur.

Therefore, If A B C are preſent, X Y and Z occur.

But ſince cauſes counteract each other, B only operates as far as the oppoſing power of C permits.

§ 86. *Induction and Deduction.*

Induction is uſually defined to be the proceſs of drawing a general rule from a ſufficient number of particular caſes; deduction is the converſe proceſs, of proving that ſome property belongs to the particular caſe from the conſideration that it belongs to the whole claſs in which the caſe is found. That all bodies tend to fall towards the earth is a truth which we have obtained from examining a number of bodies coming under our notice, by induction; if from this general principle we argue that the ſtone we throw from our hands will ſhew the ſame tendency, we adopt the deductive method.

Mere Logic requires that for the eſtabliſhment of the general rule, *all* the caſes it affects ſhould be examined; if one ſingle caſe is left unexplored, we cannot deny the formal poſſibility that it may prove to be the exception, and it would be neceſſary to reſort to ſome other conſideration not apparent on the face of the argument, to ſilence a captious objection of this kind;—thus we might urge that nature never acted capriciouſly, and that the law that governed her in many caſes would prevail in all. But this is travelling into a new argument, by way of ſhielding the vulnerable point of the one aſſailed. We are compelled however to reſort to it; and probably the incompleteneſs of many arguments in themſelves gives the chief impulſe to our curioſity and love of enquiry, exciting us to correct one ſet of obſervations by another, to confirm obſervations by experiments carefully deviſed, to try the newly obtained law upon other caſes as they ariſe, in order to reduce to the minimum the formal incorrectneſs in a chain of reaſoning, which if it had been at firſt proved to demonſtration would perhaps have been ſtated and coldly diſmiſſed as exhauſted. The conditions upon which we may be content with a ſmaller number of caſes than the whole, as a ground for the general law, are to be carefully aſcertained hereafter.

More exactly, we may define the inductive method as the proceſs of diſcovering laws and rules from facts, and cauſes from effects; and the deductive, as the method of deriving facts from laws, and effects from their cauſes. There is evidently a virtual identity between induction and logical analyſis, between deduction and logical ſyntheſis;

and one ſet of canons will ſuffice for both. The difference ſeems to be that we think of analyſis as performed for the ſake of aſcertaining the nature of the fact or thing, whereas induction only regards facts as ſubſervient to the law to be ſought for in them: ſyntheſis again ſeems to be undertaken for the ſake of producing the thing or tracing the effect, and deduction, to prove the truth and applicability of the general to particular caſes. They differ then not in the nature of the proceſs, but in the point of view aſſumed by the thinker. In analyſis and ſyntheſis he gives prominence to the ſingle caſe, the phenomenon, the world of the ſenſes, the concrete; in induction and deduction, the univerſal, the law, the world of conceptions, the abſtract, are made to predominate. But both connect the general with its cognate particulars; and even this diſtinction between them, though traceable occaſionally in the uſe of the words, may not perhaps be generally recognized.

§ 87. *The Syllogiſm, the Inſtrument both of Deduction and Induction.*

The prevalent view, that ſyllogiſm is identical with deduction, and that inductive reaſoning is of another nature, and requires its own diſtinct rules, is one of the greateſt miſtakes into which a logician can fall. The origin of it is eaſily diſcovered. Ariſtotle's *dictum*—that whatever is affirmed or denied of a whole claſs may be affirmed or denied of each part of that whole—applies only to deductive inference, and to thoſe four modes of the firſt figure which Ariſtotle conſidered to be the patterns of that method, A A A, E A E, A I I and E I O. The unfortunate expedient of bringing into one or other of theſe favoured modes every ſyllogiſm of the other figures, for the ſake of compelling a forced compliance with a dictum which really was inapplicable to it, gave to the four modes in queſtion an undeſerved pre-eminence. If ſyllogiſms not deductive—*not* drawing the particular caſe from the univerſal rule—could be reduced to others of the deductive kind, then deduction was paramount in the whole ſyllogiſtic ſcheme. Accordingly deduction and the ſyllogiſm were regarded as one and the ſame; and the words are uſed as interchangeable by ſome of the firſt logicians of the preſent day.

The popular doctrine of the uſes of the ſyllogiſm is nearly as follows. "We are at liberty, in conformity with the general opinion of logicians, to conſider the forms of the firſt figure as the univerſal type of all correct ratiocination;"[*] becauſe arguments in the other figures may be *reduced* to the firſt. In this figure we find as the firſt premiſs a general propoſition ſuch as—All men are mortal,—in which ſomething is affirmed (or denied) of a whole claſs; and another propoſition in which ſome ſpecies or individual is ſaid to be part of that claſs, as —The Pope is a man;—followed by a concluſion, in which the ſame thing is ſaid of the part, that had been of the whole in the firſt premiſs—The Pope is mortal. Now it is argued that an argument of this kind cannot help us in the ſearch for truth. In ſuch a propoſition as—All men are mortal—we include each and every man, ſo that we have ſaid already *by implication* that The Pope is mortal, and therefore the concluſion declares no new truth—nothing which was not granted us when we were allowed to ſay All men are mortal; it only unfolds what was wrapt up in the firſt premiſs. How then can ſuch an inſtrument as the ſyllogiſm help us in our enquiries, ſince whatever truth we are warranted in holding, as the concluſion, was already latent in the premiſſes?

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[*] Mr. *J. S. Mill's* Logic, i. p. 233.

Our inferences, it is argued by the ſame acute logician, are really made, not from any general rule like the given example, but from other particular facts of the ſame kind which we have obſerved. We infer that this man is mortal, becauſe A. B. and C. D. and other men have been obſerved to die. Still the deductive ſyllogiſm is not quite uſeleſs. It cannot help us to diſcover truth, but we regiſter our diſcoveries, though really made from particular facts, by general propoſitions, which we preſerve as uſeful formulæ, whence we may draw at pleaſure particular aſſertions.

This diſtinction between the acquirement and the "regiſtering" of knowledge, deſerves all attention, although the word "regiſter" is inappropriate to expreſs an act in which the mind goes far beyond its facts. I may regiſter the fact that A. B. and C. D. are mortal, becauſe I know they are dead; but if I paſs from this fact to the vaſt aſſertion that all men muſt die, I do more than merely regiſter my facts; I build a bold inference upon them, to which they bear a very ſmall proportion.

But as a full account of the value of the ſyllogiſm, the view we have given contains ſome remarkable miſtakes. Whether the amplification of the firſt figure propoſed by us, which deſtroys its excluſively deductive character, is correct, or not,— we are not at liberty to leave out of view two of the three figures, unleſs we can ſhow that all their uſes and properties are anſwered by the firſt, which we retain. So far is this from being true, that logicians have always regarded the third figure as the beſt adapted for arguing from particulars to generals, that is, for the very oppoſite to the deductive proceſs. Now does reduction to the firſt figure confer upon the third that deductive quality which it does not originally poſſeſs? No; it only turns a natural into an unnatural form.

Ariſtides was juſt,
Ariſtides was a pagan,
Therefore ſome pagans (or pagan) are juſt.

would appear in the firſt figure as

Ariſtides was juſt,
Some pagan was Ariſtides!
Therefore ſome pagan was juſt.

There is not one trace of deduction—of arguing from the general to the particular—in this reduced form. So that the pretenſions of the ſyllogiſm reſt upon all the figures, and not upon the firſt alone; and ſyllogiſms forced into the firſt figure by reduction are not to be confounded, as they have often been, with thoſe which naturally belong to it, becauſe they cannot by reduction aſſume their properties. Mr. Mill diſcards reduction, but retains its worſt conſequence, in treating the modes of the firſt figure, four in number, as fair repreſentatives of the whole nineteen modes uſually recounted by logicians. Upon a larger view it will be found that we may reaſon, either in the firſt figure or the third, from particular caſes to a univerſal law. If then all ſyllogiſms are not deductive, a complaint that the truth of the concluſion is implied in the firſt premiſs, which only amounts to ſaying that they *are* deductive, will fall to the ground.

Moreover, though it is true that when the premiſſes are given the concluſion is alſo conceded by implication, we muſt not aſſume that the premiſſes always precede. In the diſcovery of truth we have ſeen that there is always ſome preſage of the concluſion; in the form of a "queſtion" or judgment to be proved, it really precedes the premiſſes. Given the premiſſes, the concluſion is always implied, and any ſchoolboy can draw it out; but in moſt caſes the difficulty is to *find* premiſſes, or (which is the ſame thing) to find a middle term in which the two terms of the queſtion agree. Though the faculty of doing this is thought to be the ſign of a logical mind, it rather denotes inventive than reaſoning power. But, as has been obſerved, the ſtudy of any ſubject and a wide acquaintance with facts concerning it muſt have diſciplined a natural quickneſs of invention, before any great diſcoveries can be made and ſecured. It might puzzle an uninſtructed perſon even to make an equilateral triangle; and the employment of equal circles, of which the three ſides would be common radii, and therefore equal, as in the firſt Propoſition in Euclid, would be a real diſcovery, a proof of ingenuity. But the ingenuity lies in bringing in the middle notion of radii of a circle at all, which has no apparent connexion with the problem of making three given ſides of a figure equal. When the premiſſes are ſecured, no one can ſuppoſe that any acuteneſs is requiſite to diſcover the concluſion.

The radii of the ſame or equal circles are equal,
The three ſides of this figure are radii of the ſame or
  equal circles;
Therefore they are equal.

When the deductive ſyllogiſm is uſed for invention, its premiſſes are not found until ſome queſtion has ſet us upon the ſearch for them.

But the queſtion is not whether the ſyllogiſm is uſeful for diſcovery, but whether we can expreſs our procedure in ſeeking truth by any ſimpler and more general formula than that of the ſyllogiſm. We propoſe to ſhew from one or two examples impartially choſen, that every ſtep of the inductive method that has the character of reaſoning,—in other words, every ſtep but thoſe of the ſuggeſtive and inventive faculty, aſſumes one or other of the forms already deſcribed in the pure Logic.

§ 88. *Employment of defective Syllogiſms.*

When we are unable to draw a concluſion from premiſſes ſufficient to afford it, we do not immediately deſiſt from the attempt to reaſon; indeed we ſhould forfeit thereby many concluſions of which we become at laſt the moſt firmly convinced. A few examples of the defective forms will enable us to determine their value and employment.

THE RHETORICAL ENTHYMEME, as deſcribed by Ariſtotle, is a ſentence which contains the materials of a ſyllogiſm in the mode A A A. Such a ſyllogiſm is perfectly legitimate in the 1ſt Figure, and therefore amounts to abſolute proof. But if our knowledge of the facts obliges us to ſtate it in the ſecond or third Figure, the mode A A A will be found formally incorrect. Thus " As we may ſee by the example of Socrates, all wiſe men are good"—would be

Socrates is good,
Socrates is wiſe,
Therefore *all* wiſe men are good;

which is in the mode A A A, Fig. III. and draws a concluſion much too wide for the premiſſes. Is it therefore quite uſeleſs? is it a form which would never be employed? Rather it is the natural ſtep by which we ſhould be led to notice an invariable connexion between wiſdom and goodneſs. And if in this one caſe we ſee that not only Socrates is wiſe and good, but that his goodneſs is inſeparably connected with and cauſed by his wiſdom (which connection, however, we ſhould have to ſtate and prove by other arguments) the concluſion does follow from the premiſſes. Even where no ſuch intimate connexion can be proved, the concurrence of ſeveral defective ſyllogiſms of this ſort are equivalent to one demonſtrative one. In the inveſtigation of the authorſhip of the letters of Junius, Mr. Taylor employs of neceſſity a ſtring of enthymemes in the ſecond Figure, each in itſelf defective, but all together forming a very ſtrong caſe. Thus,

The author of "Junius" wrote a particular hand,
Sir Philip Francis wrote the ſame kind of hand,
Therefore Sir Philip Francis is the author of "Junius."

The author of "Junius" made certain miſtakes in correcting proof-ſheets,
Sir Philip Francis made the ſame miſtakes,
Therefore Sir Philip Francis is the author of "Junius."

The author of "Junius" had a particular ſtyle,
Sir Philip Francis wrote the ſame ſtyle,
Therefore Sir Philip Francis is the author of "Junius."

The author of "Junius" is guilty of an anomalous uſe of certain words,
Sir Philip Francis is guilty of the ſame,
Therefore Sir Philip Francis is the author of "Junius."

The author of "Junius" employs certain images,

Sir Philip Francis employs the ſame,
Therefore Sir Philip Francis is the author of "Junius."

The author of "Junius" ceaſed to write at a particular time,
Sir Philip Francis muſt have ceaſed to write at the ſame time,
Therefore Sir Philip Francis is the author of "Junius."

The reſults of theſe and ſeveral ſimilar arguments are ſummed up in a ſyllogiſm which I think concluſive, to the effect that two perſons who in ſo many points are not found to differ, muſt be one and the ſame. The rhetorical enthymemes then of all the Figures are available; but in the ſecond and third Figures they are not formally concluſive in themſelves—they are uſed tentatively, to be confirmed or refuted by other arguments.

THE EXAMPLE in like manner conceals a defective ſyllogiſm, and yet there is no argument ſo commonly employed. "The French Revolution of 1792 will end in an abſolute monarchy, becauſe the Engliſh Revolution of 1640 did ſo." Such reaſoning is only valid provided we can conclude from the fate of the Engliſh Revolution that *all* revolutions tend to abſolute monarchy, a judgment which may be true in itſelf, but cannot be formally concluded from the given premiſs. We require other compariſons and arguments to ſhow that the tendency to abſolute monarchy is an inſeparable mark of revolution, and not a mere accident, belonging to the Engliſh Revolution only. And yet examples are ſo ſuggeſtive that they often appear almoſt to amount to demonſtration; and it would be abſurd to endeavour to expel them from rhetoric or from ſcience, on the ground that they are not formally complete.

The argument known to logicians as IMPERFECT INDUCTION ſtands upon the ſame footing. Where a complete enumeration of all the caſes governed by a given law is impoſſible, either an incomplete muſt be employed, or we muſt refrain from aſcertaining that law. Yet the incomplete form is not only uſeful in default of a better, but has powers which the more perfect form does not poſſeſs. Thus, it was diſcovered that the diſtances of Mercury, Venus, the Earth, Mars, Saturn and Uranus from the Sun followed a certain law called "Bode's law of diſtances;" but between Mars and Jupiter the interval was ſo much greater than this law would lead us to expect, that Jupiter appeared an exception in a ſeries otherwiſe perfectly regular. Still the law was conſidered worthy of record—

> Mercury, Venus, &c. obſerve a certain relation of diſtance from the Sun,
> Mercury, Venus, &c. are planets,
> Therefore *all* the planets obſerve this relation.

Now in the apparently exceptional interval, between Jupiter and Mars, four ſmall planetary bodies were afterwards diſcovered which are conſidered to remove the exception, and to complete the ſeries; ſo that a law founded upon all the caſes but one, proved applicable to all without exception. The diſcovery that what ſeemed a departure from uniformity was no departure, would confer a pleaſure which the mere obſervation of the law without the check of any difficulty could not have done. It would give confidence in the fixedneſs of natural laws.

and embolden enquirers to *predict* in other like caſes. Though we ſhould not be content with an imperfect argument where a perfect one was attainable, there is a peculiar pleaſure in finding that our imperfect one is confirmed by ſubſequent obſervations; and this is one of the principal rewards of the natural philoſopher for his laborious reſearches. We ſhall be prepared then to find that defective arguments, ſuch as are employed in other ſubjects, occur in the inductive method alſo.

§ 89. *Cauſes and Laws.*

It is difficult to define accurately what we mean by a natural cauſe, and to diſtinguiſh it from a natural law. Gravitation is the *cauſe* of the fall of a ſtone; and the ſtone falls in obedience to the *law* of gravitation. But in the notion of cauſe we ſeem to imply power and energy; a man *cauſes* the death of another, who by his own act and power brings death upon him. In the field of nature power can only be improperly and metaphorically attributed to cauſes. All power reſides in the great Firſt Cauſe, and the earth has not, in the proper ſenſe of the word, *power* to attract the ſtone, ſo much as a neceſſity of attracting it. We may notice that a principle may be regarded as cauſe or law according as we look on it in connexion with the thing produced, or with the higher neceſſity that produces it; in the former caſe we aſſign it the notion of power, as being the immediate channel of a power that flows from a higher fountain, and in the latter we attribute to it rather the notion of ſubjection and neceſſity, and look for the producing power at ſome higher link in the chain.

In order to conſtitute any fact or principle, the *cauſe* of other facts, it ſhould poſſeſs the following characters.*

A. "Invariable connexion, and, in particular, invariable antecedence of the cauſe and conſequence of the effect, unleſs prevented by ſome counteracting cauſe."

B. "Invariable negation of the effect with abſence of the cauſe, unleſs ſome other cauſe be capable of producing the ſame effect." The application of this principle has been called the Method of Difference.

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* Sir *John Herſchel's* Preliminary Diſcourſe, p. 151.

C "Increaſe or diminution of the effect, with the increaſed or diminiſhed intenſity of the cauſe, in caſes which admit of increaſe and diminution."

D "Proportionality of the effect to its cauſe in all caſes of direct unimpeded action."

E "Reverſal of the effect with that of the cauſe." The application of the three laſt principles conſtitutes the Method of Concomitant Variations.

From theſe principles follow ſome practical rules for aſcertaining cauſes; ſuch as—

1. The cauſe of a given effect *may be* the ſame as we know to produce ſome ſimilar effect in another caſe better known to us.

For example, Berzelius records that a ſmall bubble of the gas called ſeleniuretted hydrogen, inſpired by accident through the noſe, deprived him for ſome hours of the ſenſe of ſmell, and left a ſevere catarrh which laſted for fifteen days. Dr. Prout ſuggeſts that the correſponding effects in Influenza *may* be traceable to the ſame cauſe as undoubtedly produced them here, to the admixture namely of this or ſome ſimilar ſubſtance with the air we breathe; and as a ſuggeſtion or anticipation this is perfectly legitimate, and may prove highly valuable. Its inadequacy as a proof may be ſhewn by throwing it into ſyllogiſtic form—

The caſe of inſpiring ſeleniuretted hydrogen is a caſe in which loſs of ſmell and ſevere catarrh follow;
Caſes of influenza exhibit theſe effects,
Therefore caſes of influenza are caſes in which the ſaid gas has been inſpired.

This is the mood A A A, Fig. ii. invalid becauſe it does not diſtribute the middle term (p. 234). It is one of the arguments deſcribed as Rhetorical Enthymemes in the laſt ſection.

2. "If in any of the facts we have to account for, there be even one in which a particular character is wanting, that character cannot be the cauſe in queſtion; for the true cauſe can never be abſent."

3. As the laws of nature are uniform, and

never capricious, we are entitled to expect that a cauſe which in ſeveral caſes produces a given effect will always do ſo; and if it appears to be otherwiſe, we ſhould either ſearch for ſome counteracting cauſes, or ſuſpect the accuracy of our obſervations.

4. "Cauſes will very frequently become obvious by a mere arrangement of our facts in the order of intenſity in which ſome peculiar quality ſubſiſts: though not of neceſſity, becauſe counteracting or modifying cauſes may be at the ſame time in action."

"For example: ſound conſiſts in impulſes communicated to our ear by the air. If a ſeries of impulſes of equal force be communicated to it at equal intervals of time, at firſt in ſlow ſucceſſion, and by degrees more and more rapidly, we hear at firſt a rattling noiſe, then a low murmur, and then a hum, which by degrees acquires the character of a muſical note, riſing higher and higher in acuteneſs, till its pitch becomes too high for the ear to follow. And from this correſpondence between the pitch of the note and the rapidity of ſucceſſion of the impulſe, we conclude that our ſenſation of the different pitches of muſical notes originates in the different rapidities with which theſe impulſes are communicated to our ears." To make ſuch an arrangement however we muſt have a preſage, and no uncertain one, of the cauſe of our phenomena; and therefore it is rather uſeful for verification, than for ſuggeſtion, of a theory.

5. "If we can either find produced by nature, or produce deſignedly for ourſelves, two inſtances which agree *exactly* in all but one particular, and differ in that one, its influence in producing the phenomenon, if it have any, *muſt* thereby be rendered ſenſible. If that particular be preſent in one inſtance, and wanting altogether in the other, the production or non-production of the phenomenon will decide whether it be or be not the only cauſe: ſtill more evidently, if it be preſent *contrariwiſe* in the two caſes, and the effect be thereby reverſed. But if its total preſence or abſence only produces a change in the *degree* or intenſity of the phenomenon, we can then only conclude that it acts as a concurrent cauſe or condition with ſome other to

be ſought elſewhere. In nature, it is comparatively rare to find inſtances pointedly differing in one circumſtance and agreeing in every other; but when we call experiment to our aid, it is eaſy to produce them; and this is, in fact, the grand application of *experiments of enquiry* in phyſical reſearches. They become more valuable, and their reſults clearer, in proportion as they poſſeſs this quality (of agreeing exactly in all their circumſtances but one), ſince the queſtion put to nature becomes thereby more pointed, and its anſwer more deciſive."

6. "Complicated phenomena, in which ſeveral cauſes concurring, oppoſing or quite independent of each other, operate at once, ſo as to produce a compound effect, may be ſimplified by ſubducting the effect of all the known cauſes, as well as the nature of the caſe permits, either by deductive reaſoning or by appeal to experience, and thus leaving, as it were, a reſidual phenomenon to be explained. It is by this proceſs, in fact, that ſcience, in its preſent advanced ſtate, is chiefly promoted."

"A very elegant example may be cited, from the explanation of the phenomena of ſound. The enquiry into the cauſe of ſound had led to concluſions reſpecting its mode of propagation, from which its velocity in the air could be preciſely calculated. The calculations were performed; but, when compared with fact, though the agreement was quite ſufficient to ſhew the general correctneſs of the cauſe and mode of propagation aſſigned, yet the *whole* velocity could not be ſhewn to ariſe from this theory. There was ſtill a *reſidual* velocity to be accounted for. At length La Place ſtruck on the happy idea, that this might ariſe from the *heat* developed in the act of that condenſation which neceſſarily takes place at every vibration by which ſound is conveyed. The matter was ſubjected to exact calculation, and the reſult was at once the complete explanation of the reſidual phenomenon."

Theſe are ſpecimens of the methods according to which reſearches into cauſes are conducted. I add one example, combining the 4th, 5th and 6th rules, and exhibiting

Proportionality of cauſe and effect, Experiment and Reſidual Phenomena in one ſet of enquiries. Beyond this, the limits I have preſcribed myſelf do not ſuffer me to go.

In Sir Humphrey Davy's experiments upon the decompoſition of water by galvaniſm, it was found that beſides the two components of water, oxygen and hydrogen, an acid and an alkali were developed at the two oppoſite poles of the machine. As the theory of the analyſis of water did not give reaſon to expect theſe products, they were a *reſidual phenomenon*, the cauſe of which was ſtill to be found. Some chemiſts thought that electricity had the power of *producing* theſe ſubſtances of itſelf; and if their erroneous conjecture had been adopted, ſucceeding reſearches would have gone upon a falſe ſcent, conſidering galvanic electricity as a *producing* rather than a *decompoſing* force. The happier inſight of Davy conjectured that there might be ſome hidden cauſe of this portion of the effect; the glaſs veſſel containing the water might ſuffer partial decompoſition, or ſome foreign matter might be mingled with the water, and the acid and alkali be diſengaged from it, ſo that the water would have no ſhare in their production. Aſſuming this, he proceeded to try whether the total removal of the cauſe (B. p. 339) would deſtroy the effect, or at leaſt the diminution of it cauſe a correſponding change in the amount of effect produced—(C. p. 340). By the ſubſtitution of gold veſſels for the glaſs without any change in the effect, he at once determined that the glaſs was not the cauſe. Employing diſtilled water, he found a marked diminution of the quantity of acid and alkali evolved; ſtill there was enough to ſhow that the cauſe, whatever it was, was ſtill in operation. Impurity of the water then was not the ſole, but a concurrent cauſe. He now conceived that the perſpiration from the hands, touching the inſtruments, might affect the caſe, as it would contain common ſalt, and an acid and an alkali would reſult from its decompoſition under the agency of electricity. By carefully avoiding ſuch contact, he reduced the quantity of the products ſtill further, until no more than ſlight traces of them were perceptible. What remained of the effect might be traceable to impurities of the atmoſphere, decompoſed by contact with the electrical apparatus. An experiment determined this; the machine was placed under an exhauſted receiver, and when thus ſecured from atmoſpheric influence, it no longer evolved the acid and the alkali.

A formal analyſis of theſe beautiful experiments will illuſtrate the method of applying the rules of pure Logic in other caſes.

I. Statement of the caſe, the *reſidual* cauſe being ſtill undiſcovered.

"The decompoſition of water by electricity, produces oxygen and hydrogen, with an acid and an alkali."

II. Separation of the *reſidual* from the principal cauſe.

a. "The decompoſition of water produces oxygen and hydrogen."

b. "The production of an acid and alkali in the decompoſition of water *may be cauſed* by action on the glaſs veſſel containing the water." (Problematical Judgment—A.)

III. The latter Judgment—b—diſproved by a ſyllogiſm in Mood E A O, Fig. iii, with a concluſion that *contradicts* it.

"A caſe in which I employ a veſſel of gold cannot involve any decompoſing action on a glaſs veſſel,

"A caſe in which I employ a gold veſſel ſtill gives the acid and the alkali,

"Therefore caſes of the production of the acid and alkali are not always caſes in which glaſs is decompoſed."

IV. Another attempt to ſuggeſt the reſidual cauſe.

"The acid and alkali are produced by the decompoſition of impurities in the water employed."

Syllogiſm in A A I, Fig. iii. *tending to* prove this.

"An experiment with *diſtilled* water muſt admit *leſs* impurity,

"An experiment with diſtilled water gives *leſs* acid and alkali,

"Therefore ſometimes with leſs impurity we have leſs acid and alkali."

V. "The contact of moiſt hands" may be an additional cauſe of the reſidual phenomenon.

Improved ſyllogiſm in A A I, Fig. iii. to include this concurrent cauſe.

"An experiment with diſtilled water, and apparatus kept from contact of hands will admit *ſtill leſs* impurity;"

"An experiment, &c. reſults in the production of ſtill leſs acid and alkali,

"Therefore ſometimes with ſtill leſs impurity we have ſtill leſs acid and alkali."

VI. Amended ſyllogiſm. A A A. Fig. iii.

"A caſe where we uſe theſe precautions *in vacuo* is a caſe of *no* impurity,"
"A caſe where we uſe, &c. *in vacuo* is a caſe of *no* acid and alkali,
"Therefore a caſe of no impurity is a caſe of no acid and alkali."

VII. Immediate inference from laſt concluſion.
"Caſes of no-impurity are caſes of non-production of acid and alkali,"
"Therefore" (according to the example in p. 219, Diviſion II, of inference from A.)
"All caſes of production of acid and alkali are caſes of ſome impurity;"
which was to be proved.

An example like this brings into a ſtrong light many of the characteriſtics of inductive reaſoning. Forms uſually conſidered to be deductive are here freely employed. The later ſteps tend to confirm the earlier, on which, however, they themſelves depend; ſo that a mutual confirmation is obtained from ſetting them together. When the chemiſt ſubſtituted gold veſſels for the glaſs, and inferred from the continuance of the effect under this change that the glaſs could have nothing to do with its production, it was formally poſſible in the then ſtate of knowledge that the glaſs might be the cauſe in the one experiment, and the decompoſition of the gold in the other. But the later ſteps, which ſhewed that the effect varied with the variations in a circumſtance wholly diſtinct from the decompoſition of glaſs or gold, reduced the poſſibility of maintaining ſuch a view to the very loweſt amount. Even the premiſſes of particular ſyllogiſms in the chain are ſometimes teſted and corrected by the concluſion, although formally the concluſion ſhould entirely depend upon the premiſſes. The experimenter expected to find that the uſe of diſtilled water would exclude *all* impurity; and he intended that his premiſs (ſee No. IV.) ſhould aſſert as much; but when it turned out in the concluſion that the ſuppoſed products of the impurity were ſtill preſent, he was reduced to the choice between abandoning that cauſe and re-caſting his premiſs ſo as to admit that the cauſe was ſtill preſent—“ the uſe of diſtilled water gives *leſs* impurity.”

§ 90. *Colligation of Facts in Induction.*

The difficulty of finding a law to explain ſome groups of facts ariſes from the want of ſome conception which may bind them together, or (to uſe Dr. Whewell's expreſſion) effect their Colligation. The diſcovery of a ſuitable conception is conſidered by ſome the moſt important act of Induction. A further ſtep is required to complete it; the conception muſt be capable of Explication or Definition, not indeed of *adequate* definition, ſince we ſhall have to alter our deſcription of it from time to time with the advance of knowledge, but ſtill capable of a preciſe and clear explanation. For example, a large claſs of facts are bound together by the notion of "chemical affinity," and could not be underſtood and arranged without the thread of this conception to run through them. To refer them to this their proper conception is one operation; to give a proper explanation of chemical affinity another.

DEFINITION. — Chemical affinity is the power by which the particles of one elementary body are made to cohere with thoſe of another, ſo as to produce a new ſubſtance with characters either diſtinct from or oppoſed to thoſe of the conſtituents ſeparately.

PROPOSITION.—The tarniſhing of metals, the neutral ſalts, &c. &c. are inſtances of the action of chemical affinity;

Therefore we expect to find in them the characters mentioned in the definition.

This is a ſyllogiſm in U A A. Fig. I.; and whilſt our reaſoning faculty can draw it out and appreciate its truth and applicability, reaſon alone could not have ſuggeſted the premiſſes. No rules can be given for the diſcovery of the appropriate conception that explains our facts; "Such events," ſays Dr. Whewell, "appear to reſult from a peculiar ſagacity and felicity of mind — never without labour—never without preparation; yet with no conſtant dependence upon preparation, upon labour, or even entirely upon perſonal endowments." The ſuggeſtion of the conception may be due almoſt entirely to accident; the explication of it, often by far the more difficult ſtep, cannot be accidental, but will proceed from a natural ſagacity highly diſciplined by ſcientific purſuits.

Conceptions not wholly correct may ſerve for a time for the Colligation of Facts, and may guide us in reſearches which ſhall end in a more exact Colligation. The theory of *circular* motions of the heavenly bodies was of this kind; and in its turn the conception of epicycles. The theory of Phlogiſton in chemiſtry made many facts intelligible; before the correcter one of Oxidation ſuperſeded it. So with the theory of "Nature abhors a vacuum," which ſerved to bring together many cognate facts, not previouſly conſidered as related. Any incorrect conception of this kind has a place in ſcience, whilſt and in ſo far as it is applicable to facts and renders them intelligible. As ſoon as facts occur which it is inadequate to explain, we either correct, or replace it by a new one.

§ 91. *Verification of Inductions.*[*]

"It is of great moment to diſtinguiſh the characters of a ſound induction. One of them is its ready identification with our conceptions of facts, ſo as to make itſelf a part of them, to engraft itſelf into language, and by no ſubſequent effort of the mind to be got rid of. The leading term of a true theory once pronounced, we cannot fall back even in thought to that helpleſs ſtate of doubt and bewilderment in which we gazed on the facts before. The general propoſition is more than a ſum of the particulars. Our dots are filled in and connected by an ideal outline which we purſue even beyond their limits,—aſſign it a name, and ſpeak of it as a *thing*. In all our propoſitions this *new thing* is referred to, the elements of which it is formed forgotten; and thus we arrive at an inductive formula, a general, perhaps a univerſal, propoſition."

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[*] I tranſcribe this § from the Quarterly Review, vol. 68, p. 233, as I deſpair of expreſſing its purport in words of mine, half ſo clearly and elegantly.

"Another character of ſound inductions is that they enable us to predict. We feel ſecure that our rule is baſed upon the realities of nature, when it ſtands us in the ſtead of more experience; when it embodies facts, as an experience wider than our own would do, and in a way that our ordinary experience would never reach; when it will bear, not ſtreſs, but torture, and gives true reſults in caſes ſtudiouſly different from thoſe which led to its diſcovery. The theories of Newton and Freſnel are full of ſuch caſes. In the latter, indeed, [the theory of Polarization] this teſt is carried to ſuch an extreme, that *theory* has actually remanded back *experiment* to read her leſſon anew, and convicted her of blindneſs and error. It has informed her of facts ſo ſtrange as to appear to her impoſſible, and ſhowed her all the ſingularities ſhe would obſerve in critical caſes ſhe never dreamed of trying."

"Another character which is exemplified only in the greateſt theories, is the *conſilience of inductions*, where many and widely different lines of experience ſpring together into one theory which explains them all, and that in a more ſimple manner than ſeemed to be required for either ſeparately. Thus in the infinitely varied phenomenon of phyſical aſtronomy, when all are diſcuſſed and all explained, we hear from all quarters the conſentaneous echoes of but one word, GRAVITATION. And ſo in Optics—each of its endleſs claſſes of complex and ſplendid phenomena being interpreted by its own conception—when theſe conceptions are aſſembled and compared, they all turn out to be tranſlations into their peculiar language of the ſingle phraſe TRANSVERSE UNDULATION. Mr. Whewell has given us, as examples of the 'Logic of Induction,' what he terms inductive tables of each of theſe noble generalizations, which enable us to trace, as in a map, the ſeparate rills of diſcovery flowing at firſt each in its own narrow baſin, thence confluent into important ſtreams, which uniting at length into one grand river, bear downwards to an ocean of truth beyond our tracing."

§ 92. *Canon of Induction.*

The diſcovery that in a certain caſe an effect has followed from particular cauſes would be of ſmall practical value, unleſs there were ſome ground for believing that in other ſimilar caſes the ſame cauſes had been in operation. But all our experience goes to convince us that *under the ſame circumſtances and with the ſame ſubſtances the ſame effects always reſult from the ſame cauſes.* This great inductive principle is itſelf proved by induction, and partakes of the ſame formal defect that may be charged againſt other inductive reſults, *viz.* that its terms are wider than our experience can warrant. Many groups of facts, connected as cauſes and effects, have not been examined; and in them it is conceivable at leaſt that there may be capricious cauſes producing oppoſite effects at different times. If this were otherwiſe—if the canon was the reſult of a ſimple enumeration of all poſſible caſes, its preſent value as a rule would diſappear; ſince it is to unknown and unexamined caſes that we chiefly wiſh to apply it. We draw a univerſal canon from an experience leſs than univerſal, and then employ it to juſtify us in drawing other univerſal truths from other particular experiences. But no one ſeriouſly thinks of impugning the inductive method on this ground. It proceeds in the faith that the univerſe—the Coſmos—will ever be ſubject to ſtrict order and general laws; and nothing has occurred hitherto to diſturb a belief upon which ſcience builds her hopes of progreſs—her very exiſtence.

§ 93. *Deduction.*

Deduction is the downward proceſs, as induction is the upward; it infers the particular from the general as induction draws the general from the particular. It proceeds either from general axioms, which being ſelf-evident require no prior proof, or from laws and rules previouſly aſcertained by induction, or affirmed by an authority which we do not queſtion. Putting aſide the precepts of revelation, as proceeding from the Divine Mind, and therefore beyond the rules which govern human knowledge, perſons have been found to maintain that induction muſt always, even where the axioms of mathematics are in queſtion, have preceded deduction; whilſt it is maintained on the other hand that mathematical axioms are given *a priori*, and that although they could not have been known without obſervation, they contain a notion of neceſſity not to be gathered from any obſerved facts. Experience may tell us, it is argued, that "If equals are added to equals, the wholes *are* equal;" but the axiom really means that the wholes *are and muſt be* equal, and it is impoſſible for experience to reach ſo far. Queſtions like this, as reſpecting the grounds and origin of our ideas, belong to Metaphyſics, Logic being content to examine the laws that govern our uſe of ideas.* Whatever ſhare induction may have in originating axioms, it is certain that they are ſelf-evident, and need no inductive ſupport; and therefore the mathematical ſciences, which are founded on them, are called deductive.

In the other ſciences deduction and induction are mutually confirmatory. A deduction is correct in proportion as its general premiſs is warranted by induction; whilſt we are aſſured of the ſoundneſs of an induction by attempting to uſe it deductively, as applied to new facts. All the ſciences therefore of nature and the univerſe are by turns inductive and deductive. The one method predominates in the earlier, as the other in the later ſtages of their hiſtory. Thus the grand generalizations of Aſtronomy ſeem to leave us little to hope from further inductions; whilſt in Chemiſtry the indications of connexion between Electricity, Magnetiſm, Light, Heat and Cryſtallization, afford us ground for hope that the ſcience is about to make a grand ſtride in the inductive direction.

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* A brilliant polemic on this never-to-be-ſettled queſtion may be found in *Whewell's* Phil. Ind. Sci. B. I. ch. vi. *Mill's* Logic, II. ch. v. Quarterly Review, vol. 68. Art. on Whewell, and Phil. of Ind. Sci. vol. II. p. 669.

§ 94. *Syllogiſms of Analogy.*

Analogy has been defined "The ſimilarity of ratios or relations;" and as each relation ſuppoſes two cognate things, a compariſon of relations would imply four things, and four terms to expreſs them. Thus (to employ one of Archbiſhop Whately's examples) when Mandeville uſes as an argument againſt popular education, that "If the horſe knew enough he would ſoon throw his rider," he intends to imply two pair of related terms—

> As the horſe is to its rider, ſo is the people to its rulers,

and to aſſert further that ſince the one relation depends upon the continuance of ignorance on the part of the horſe, the other depends upon ignorance alſo. Common ſenſe ſuggeſts the refutation of ſuch an argument; we deny that the relations *are* ſimilar, or at leaſt that the ſimilarity reaches ſo far as to warrant ſuch an aſſertion as is founded upon it. Similarity of relations may exiſt however where there is no reſemblance between the related things.

But in popular language we extend the word analogy to include reſemblances of things, as well as of relations. Analogy in this ſenſe has exerciſed an immenſe influence on the formation of language. In numberleſs caſes viſible or tangible things lend their names to inviſible and ſpiritual, from a reſemblance more or leſs ſtriking between them. *Tranſgreſſion* in its primary ſenſe means the croſſing over a viſible boundary; *right* means ſtraight, and *wrong* means twiſted. We ſpeak of a *clear* ſtatement, a *lofty* mind, and a *deep* thought, all theſe adjectives being drawn from the analogies of the material world. Whilſt we can exhibit theſe in the form of a ſtatement of proportions, ſo as to vindicate the original ſenſe of analogy, it is not neceſſary, nor in all caſes natural, to do ſo. We may conſider therefore that ſimilarity of attributes, as well as of relations, may have the name of analogy.

Employed as an argument, analogy depends upon the canon—*the ſame attributes may be aſſigned to diſtinct but ſimilar things, provided they can be ſhown to accompany the points of reſemblance in the things, and not the points of difference.* But ſince the preſuppoſition of a power of diſcerning to what part of the things the attributes belong, is indiſpenſable, the argument itſelf depends for its weight upon ſomething external to itſelf, and ſinks into a mere expoſition. In a ſyllogiſm proving that the metropolis, as the heart of a ſtate, ſhould not be ſuffered to become too large, becauſe a large heart is diſeaſed, the real diſpute would not be about the ſyllogiſm itſelf—

> The heart in relation to the body ſhould not be too large,
> The heart in relation to the body = (partly) the metropolis in relation to the ſtate,
> Therefore the metropolis to the ſtate ſhould not be too large.

This inference (in E U E. Fig. iii.) is faultleſs, provided we admit that the partial identity eſtabliſhed between the heart and the metropolis includes the point of ſize; and to decide this, other arguments will be requiſite, which, if unſucceſsful, will render the preſent one falſe, if ſucceſsful, needleſs. And therefore arguments of this kind, founded on a queſtionable reſemblance, are uſed rather to ſuggeſt compariſons and ſo perſuade, than to compel conviction; and philoſophers have had great cauſe to complain of the many fallacies which become current through falſe "Metaphorical analogies."

But where the reſemblance between two things is undoubted, and does not depend on one or two external features, analogy tends much more ſtrongly to perſuaſion at leaſt, though it cannot amount to demonſtration. Its principle would be—*When one thing reſembles another in known particulars, it will reſemble it alſo in the unknown.* The expreſſion of their agreement muſt be a *qualified* judgment of identity—a U. They muſt not be of the ſame kind, but only of a ſimilar one, otherwiſe the argument is a mere caſe of Example. Neither muſt the uſual teſts have been applied (ſee p. 339) to prove that the known particulars invariably accompany the unknown, otherwiſe, as Mr. Mill obſerves, we trench upon the ground of Induction. In venturing thus to aſſign attributes to a thing, becauſe other things of a different claſs have them, we ſhow our dependence on the regularity and conſiſtency of creation. When the geologiſt diſcovers a foſſil animal with large ſtrong blunt claws, he infers that it procured its food by ſcratching or burrowing in the earth, truſting that a conformation which in other kinds of animals accompanies this particular mode of life, would not be arbitrarily and exceptionally aſſigned in this caſe to an animal of different purſuits. The following example, from Biſhop Butler, of a falſe analogy, and its refutation, will ſhow the ſyllogiſtic treatment of analogies:—

> "There is little preſumption that death is the deſtruction of human creatures. However there is the ſhadow of an analogy, which may lead us to imagine it is—the ſuppoſed likeneſs which is obſerved between the decay of vegetables and of living creatures. And this likeneſs is indeed ſufficient to afford the poets very apt alluſions to the flowers of the field, in their pictures of the frailty of our preſent life. But, in reaſon, the analogy is ſo far from holding, that there appears no ground even for the compariſon, as to the preſent queſtion; becauſe one of the two ſubjects compared is wholly void of that which is the principal and chief thing in the other, the power of perception and of action; and which is the only thing we are enquiring about the continuance of. So that the deſtruction of a vegetable is an event not ſimilar, or analogous, to the deſtruction of a living agent."

This may be reſolved into two ſyllogiſms.

I. Analogy—in A U A, Fig. iii.

The decay of vegetables is total deſtruction,
The decay of vegetables = (for preſent purpoſes) the decay of living creatures,

Therefore the decay of living creatures is total deſtruction.

II. Refutation.

The decay of animals is that of living acting creatures,
The decay of vegetables is not that of living acting creatures,
Therefore the decay of vegetables is not the ſame as that of animals.

The Concluſion E of the latter ſyllogiſm is oppoſed as a contrary (p. 208) to the premiſs U of the former.

§ 95. *Syllogiſms of Chance.*[*]

Chance may be deſcribed as the amount of probability with which we expect one or other, out of two or more uncertain events. Uncertain events are thoſe for which we can ſee no cauſe or law to determine the occurrence of one rather than of another. As all queſtions into which this notion enters demand a numerical ſtatement, the doctrine of chances is always regarded as a branch of mathematics; and its intricacies can only be explained by perſons deeply converſant with that ſcience, who have turned their attention to this ſpecial branch of enquiry. I purpoſe at preſent only to lay down the elements of it, and give a few of the ſimpleſt examples of their application.

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[*] I have borrowed parts of this ſection from a great authority in calculations of Chance—Profeſſor *De Morgan.* Formal Logic. ch. IX.

The probability that a wholly uncertain event will happen, is as the number of caſes in which it *can*, to the number of thoſe in which it *cannot* occur.

To give a familiar illuſtration of this axiom, let us enquire what are the chances, in toſſing up a halfpenny, that it will give a head at or before the third throw? We muſt aſſume that the coin has no tendency in itſelf to give a preponderance to head or tail, as the leaſt appearance of ſuch a law puts calculations of chances into confuſion, unleſs indeed we happen to be able to calculate the preciſe amount of its action: if the parts in relief on the face of a coin are much greater than on its reverſe, perhaps they may have a ſenſible influence upon the number of tails thrown with it, as the heavier ſide of it will tend to reach the ground firſt. Now here are eight events, any one of which may occur in three throws—

1. No head may be thrown.
2. The 1ſt throw only may be a head.
3. The 2nd ——————————
4. The 3rd ——————————
5. The 1ſt and 2nd ——————
6. The 1ſt and 3rd ——————
7. The 2nd and 3rd ——————
8. All three may be heads.

Out of the eight, the firſt alone is adverſe to our chance; in all the reſt a head *is* thrown at or before the third trial; and according to the axiom, the chances in our favour are ſeven (events) to one (event); or $\frac{7}{8}$ of the caſes make for us.

That this reſult is fairly calculated may be gathered from another mode of proof. Suppoſe that eight diſtinct trials are made, to ſee at what throw the firſt head comes; we may calculate that in ſeven out of the eight trials it is likely to occur at or before the third. As heads are as likely to be thrown as tails, we expect that in half, that is four, caſes, heads will make their appearance the firſt time. The ſame principle applies to the other four caſes, in which we muſt go on to a ſecond throw; in half of the ſecond throws, that is, two, we expect heads. There remain only two caſes in which it will be neceſſary to proceed to a third trial, to get the head; and half of them, or one, will be heads. Thus—

In 4 caſes, a head firſt throw.
In 2 ——, —— ſecond ——
In 1 ——, —— third ——.
—
7

leaving only one of the eight trials in which it will be neceſſary to go further. Here again we have ſeven favourable events to one unfavourable; in common language the odds are ſeven to one.

There is no difficulty in ſtating the reſult thus attained, in a ſyllogiſm.

$\frac{7}{8}$ of the groups of three throws give a head,
This trial is to be a group of three throws,
Therefore this trial ($\frac{7}{8}$) will give a head.

The fraction written after the ſubject of the concluſion is to be read "It is 7 chances out of 8;" or, taking the numerator for the chances on the one ſide, and the difference between it and the denominator for thoſe on the other, "The odds are 7 to 1."

The origin of the axiom is involved in the ſame difficulty as attends the axioms of geometry. How do we come to expect that in the long run head and tail will nearly divide the throws between them? Why do we not look for a long unbroken ſeries of one or the other? Experience, no doubt, firſt ſuggeſted this abſolute indifference of nature, to two events neither of them having any known cauſe that ſhould give it a preponderance. But it may ſtill be queſtioned whether the intricate calculations founded on this axiom are mere generalizations of experience, and whether our faith in the neceſſary truth of the axiom be not more than the ſum of our experiments. Certain it is that experience confirms it. In two ſeries of 2048 ſets of throws, made by Buffon and by a pupil of Profeſſor de Morgan's, the reſults coincided very cloſely with each other and with the *a priori* calculation. A ſlight exceſs of tails over heads in both experiments may be accounted for by the diſturbing cauſe ſuggeſted above—the ſuperior weight of the head-ſide of the coin.

In calculations like the preceding, whilſt we aſſume that all the operating cauſes are equal; that neither gravitation, nor the mode of applying the force, has any tendency to bring more heads than tails, we may proceed ſafely without particular experiments, on the general principle that governs *all* events of equal uncertainty. But the doctrine of chances is applied to other ſubjects in which we have no means of calculating the amount of the cauſes in one ſcale or the other, except by collecting many obſervations of their effects. An Inſurance Company aſcertains in this way the average duration of life, and calculates its premiums a little higher than this average requires; whatever is over being profit. It muſt even take into account the localities from which it is to expect clients; an average calculated for London, where, according to M. Quetelet, 1 in 46 die, annually, would be ruinous in Paris, where the deaths are as many as 1 in 32. Certain unaſcertainable cauſes determine the number of deaths; and, looking at paſt reſults, the inſurers fix, not the cauſes, as in induction, but the amount of expectation they entertain that the ſame effects will be again and again repeated, it being ſuppoſed that all the cauſes continue in operation.

To verify by experiment the axioms of chance, a wide range of facts is required, becauſe a ſeries of a few caſes often exhibits great aberrations from a rule that never fails to vindicate itſelf in a longer courſe of trials. An Inſurance Office with five or ten clients only, might be ruined in a year by two deaths. In ſome of the experiments alluded to above, a head was not thrown till the 11th, the 14th and the 16th throws. It is not unuſual to find a family with ſix or eight ſons and no daughters; and yet the whole number of male, is very nearly equal to that of female, births throughout the world.

In many caſes chance affects both premiſſes of our argument. Imagine a gold, a ſilver and a leaden urn, the firſt containing four white and two black balls, the ſecond and third ſix white balls each; and ſuppoſe that I am to draw one ball blindfold from one of the three urns, I know not which;—what are the chances in favour of my fixing on a black ball? The black ball can only be drawn from the golden urn; and the chance that I go to that at all is $\frac{1}{3}$. If I find the urn, the black balls in it are only $\frac{2}{6}$ of the whole. Now another axiom applies to this caſe, viz. That when one uncertain event depends upon another uncertain event, the chance of its happening is as the product of the chances in favour of both uncertain events to the product of the chances againſt them. Here then is the ſyllogiſm—

> My drawing from the golden urn is $\frac{1}{3}$ of the poſſible caſes,
> My drawing a black ball is $\frac{2}{6}$ of the poſſible drawings from that urn,
> Therefore my drawing a black ball is $\frac{1}{9}$ of the poſſible caſes.

or

$$B \text{ is } \tfrac{1}{3}\, A,$$
$$C \text{ is } \tfrac{2}{6}\, B,$$
$$\therefore C\ (\tfrac{1}{9}) \text{ is } A.$$

In other words, there are 16 to 2, or 8 to 1, againſt my drawing a black ball. This eaſy caſe may be verified by conſidering all the balls as thrown into one urn; when there would be two black and 16 white—or $\frac{2}{18}$ black. Two or three other formulæ for the application of this axiom are added for the reader to fill up.

A E E. Fig. II.
All A ($\frac{1}{2}$) is B,
No C ($\frac{2}{3}$) is B,
Therefore No C ($\frac{1}{3}$) is A.

Here the fractions denote — even chance two to one—and one to two—reſpectively.

A A I. Fig. III.
All A ($\frac{3}{4}$) are B,
All A ($\frac{4}{5}$) are C,
Therefore ſome C ($\frac{3}{5}$) are B.

In Lambert's Organon, vol. II. this ſubject is purſued and many formulæ given, ſome of a highly complicated kind. We ſhall leave them to mathematicians, upon the borders of whoſe province we are at preſent ſtanding.

We muſt beware of extending the doctrine of chances to caſes not really pertaining to it. Where we expect a change in the ſtate of our knowledge of the uncertain event, the numerical ſtatement of chances is only made to be overthrown; thus, when *one* witneſs depoſes to an occurrence and *three* witneſſes deny that it took place, it will be uſeleſs to ſtate the probability as 3 to 1 againſt the occurrence, becauſe another ſtep may convince us that the one witneſs is an upright, truſtworthy perſon, and the three on the other ſide notoriouſly falſe and deceitful, with a decided intereſt in their preſent ſtory. Again, we cannot always be ſure that we have arranged all the poſſible caſes connected with the ſubject. D'Alembert maintained that it was *two* to one that a head would appear before the third throw, whereas it is known to be *three* to one. If ſuch inaccuracies can occur in ſo ſimple a caſe, how much more difficult to enumerate the chances when human paſſions and miſtakes enter into the caſes we are to examine!

§ 96. *Syllogiſms of Claſſification.*

Claſſification, which enters into all ſciences, is the baſis of ſome of them, as Botany, Mineralogy and Zoology. In every act of claſſification two ſteps muſt be taken; certain marks are to be ſelected, the poſſeſſion of which is to be the title to admiſſion into the claſs, and then all the objects that poſſeſs them are to be aſcertained. Where the marks ſelected are really important, and connected cloſely with the nature and functions of the thing, the claſſification is ſaid to be natural; where they are ſuch as do not affect the nature of the objects materially, and belong in common to things the moſt different in their main properties, it is artificial. The botanical ſyſtem of Linnæus is tainted with the defect that it groups together plants of very different aſpects and properties, merely upon the ground that they have the ſame numbers of ſtamens and ſtyles; that is, it is too artificial a ſyſtem.

A claſs cannot always be defined in words, ſo as to deſcribe *every* ſpecies in it. From the loweſt of its ſubdiviſions to the higheſt we paſs through ſo many ſhades of difference, that we have a difficulty in perceiving and expreſſing the likeneſs between the extremes; and properties which were prominent at the bottom of the ſcale, are in the higher ſteps forgotten, as nobler ones come into view. To diſtinguiſh the polyp, the loweſt ſpecies in the animal ſeries, from a plant, it muſt be defined as "having a digeſtive cavity;" whereas the definition uſually given for higher animals, and for the conception animal in general, conveys that they are "beings endowed with life and ſenſation." Still we group them together by our perception of likeneſs; which though not ſo obviouſly applicable to the ends of the ſeries viewed together, and apart from the intermediate links, becomes ſo when we paſs regularly along the chain. We might not be able to prove that the polyp had ſenſation at all, if there were not creatures a little higher in the ſcale of being, reſembling the polyp in other particulars, and exhibiting more plainly the ſenſe of feeling. We preſume that it exiſts in the lower, becauſe we ſee it in the higher, and though it decreaſes as we deſcend, we cannot ſhow that it has ceaſed. I have remarked that the definition of a genus is the adequate definition of its loweſt ſpecies only, ſince one which included any higher properties than the loweſt exhibits, would of courſe exclude it. But in claſſification the definition is not ſo much uſed as the *type*, that is, ſome one pattern ſpecies, by likeneſs or unlikeneſs to which we arrange the others, and aſſign them a higher or lower degree.

Though the ſpecies in any great claſs riſe by the ſteps of a regular arrangement, the ſame ſeries muſt not be continued from the higheſt of one kingdom to the loweſt of the next above it. The higheſt plant is often conſidered next below the loweſt animal, whereas it is much more like, though infinitely inferior to, the higheſt animal. The animal, vegetable and mineral kingdoms rather reſemble ladders of equal height reſting upon three different ſteps of a houſe, than ladders raiſed one upon the other. The loweſt animal, the loweſt plant, and the loweſt mineral anſwer to each other; and the complex animal organiſm, the tall and beautiful tree, and the regular group of cryſtals correſpond in ſome meaſure at the top of the reſpective ſcales.

A ſyllogiſm like the following is adapted to expreſs claſſification.

U A A. Fig. I.

All beings endowed with life and ſenſation = animals,
The polyp . . . . the man have life and ſenſation,
Therefore they are animals.

§ 97. *Categories.*

Whilſt pure Logic neglects the *real* nature of the things it deals with, and inveſts them with a merely formal value, logicians in almoſt every age have endeavoured to frame ſchemes of claſſification in which things ſhould be arranged according to their real nature. To theſe the name of Categories, or as we might render it Attributions, has been given; for whilſt they are claſſes of things and not of propoſitions, ſo that they do not properly *attribute* any quality to a ſubject, they are conſtructed with a view to the more ready diſcovery of attributes when required. They are intended, like the labelled drawers in a cabinet, to be a well arranged repoſitory of the treaſures of thought and knowledge, in which they may be kept ſecure and ready for uſe. As pure Logic is not a real ſcience, ſuch a ſyſtem of arrangement for things and the attributes of things muſt belong to ſome other ſyſtem; it is in fact eſſentially metaphyſical, and if admitted into Logic at all, muſt belong to the application of it, wherein we employ the pure forms of thought to diſcover the nature of things.

We require of a good ſyſtem of Categories that it provide a place for every ſimple notion, and that its heads or diviſions be ſpecific enough to furniſh real help in finding the attributes of any ſubject; in two words, that it be exhauſtive and ſuggeſtive. Tried by this teſt, ſuch diviſions as that into Subſtance, Mode, and Relation will be rejected as comparatively uſeleſs; if complete and exhauſtive, they are too vague to offer any tangible ſuggeſtions. Even the more elaborate diviſion of Ariſtotle is open to this charge; not to dwell upon the accuſations ſometimes made that it is confuſed and incomplete. He divides words or notions into ten claſſes, viz. Subſtance, Quantity, Quality, Relation, Place, Time, Poſition, Mode of being, Doing, and Suffering. Trendelenburg finds an exact correſpondence between theſe and the grammatical diviſion of the parts of ſpeech; the firſt four correſponding to Subſtantives and Adjectives, the next two to Adverbs, and the laſt four to the active, paſſive and neuter verbs; but perhaps he puſhes a good ſuggeſtion, that Ariſtotle ſought in language the ground work of his arrangement, ſomewhat too far. Another important ſuggeſtion would reduce the number of the principal Categories to four, Subſtance, Quantity, Quality, and Relation; of the laſt of which the remaining ſix are only ſubdiviſions, for Place and Time are the relation of things to each other in ſpace and time, and the remaining four imply connection with other things.* The Hindu ſyſtem of Kanâda, which according to a very diſtinguiſhed Orientaliſt, Profeſſor H. H. Wilſon, is in its origin wholly independent of the Ariſtotelian, though it bears a marked reſemblance to it, deſerves our attention, if only as a diſtinct teſtimony to the need of ſome ſuch claſſification. He divides the Padartha (or objects of proof) into ſix; Subſtance, Quality, Action, Community, Property and Relation;—to theſe ſome of his commentators have added that of Privation (of any of the others). This is not the place for a ſurvey of the ſyſtems of Pythagoras, Plato, Plotinus, Kant and others who have drawn up liſts of Categories.

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* See *Stallbaum. Parmenides.* Prol. p. 170.

If I venture to propoſe a ſcheme of Categories not to be found elſewhere, it is with the belief that many ſuch attempts muſt be made before a uſeful, not to ſay perfect, ſyſtem can be conſtructed. And when attained, its value will be proportioned to the accuracy of the ſpecific explanation we are able to give of each category. A complete analyſis of the whole ſcheme would be in fact a metaphyſical ſyſtem.

TABLE OF THE CATEGORIES.

Conceivable Things are

- SUBSTANCE
- Attribute
  - QUANTITY
  - QUALITY
  - Relation
    - of TIME
    - of SPACE
    - of CAUSATION
    - of COMPOSITION
    - of AGREEMENT & REPUGNANCE
    - of POLAR OPPOSITION
    - of FINITE TO INFINITE.

The ultimate members in this diviſion are ten in number—an accidental coincidence with the Ariſtotelian liſt. They are—Subſtance, Quantity, Quality, Relation of Time, of Space, of Cauſation, of Compoſition, of Agreement, of Polar Oppoſition, and of Finite things to the Infinite. Moſt of theſe names will be underſtood by every perſon likely to ſtudy a ſyſtem of Categories; and as it is neceſſary at preſent to ſtate reſults only, they may be paſſed over without comment. The ninth in the liſt however, the Relation of Polar Oppoſition, may not ſo eaſily be underſtood. We find that in different parts of the field of knowledge pairs of oppoſite things unite and form a new whole different from either of them. In Morals, Ariſtotle's doctrine of the Mean is a caſe in point: courage, for example, is regarded as the line of indifference between audacity and an undue ſenſe of danger, and the notion of it is not complete without both theſe elements. In Chemiſtry, the neutral ſalts, and the ſtate of equilibrium of poſitive and negative electricity, are examples. In Art, the neceſſity of a balance of conſcious activity and the unconſcious natural energy, of the critical and creative faculties, may, if Schelling be correct, ſupply another. Above ſixty paſſages from various authors are before me, ſhewing how different minds occupied on different ſubjects, not excluding the higheſt of all, Religion, fall into this law without knowing it. And when we ſpeak of "half-truths" or reprehend men for their "one-ſidedneſs," in reality our ground of complaint is that this law has been broken or overlooked. Raſhneſs is often conſidered courage; and diligent ſtudy of art paſſes for artiſtic ſkill. The neceſſitarian, the haſty theoriſt, the ſuperſtitious, are victims of half-apprehended truths, which turn into deadly errors; and it would not be hard to ſhew that the whole taſk of a great thinker has often been to call attention to the oppoſite element, too much overlooked, and to unite what common minds have decompoſed.

> Alterius ſic
> Altera poſcit opem res, et conjurat amice.

But this ſubject is worthy of a fuller illuſtration than can be afforded it here.

The Logic of Coleridge is founded upon this principle; and he has noticed that that of Giordano Bruno reſts upon the ſame baſis.

§ 98. *A Diviſion of the Sciences.*

The table of Categories enables us to aſcertain what kinds of attributes may belong to any conception, no matter from what department of knowledge it may be taken; conſequently it is applicable to all ſciences.

A diviſion of the ſciences, on the other hand, tends to ſeparate different diſtricts of knowledge, with the conceptions that belong to them, from one another. It is deſirable to attempt ſuch a diviſion, as the concluſion of a treatiſe on Logic; if for no other reaſon, in order that we may know to how many ſubjects we may have to direct our rules.

A ſcience is a ſyſtematic arrangement of all the laws which belong to any one ſubject. The three great fields of human reſearch are—the Divine Nature, the nature of the human mind, and the nature of the univerſe; and correſponding to them are three principal groups of ſciences—the Theological, the Pſychological, and the Coſmical or Natural. Of the members of each group different enumerations may be given. In the preſent imperfect attempt, aſſiſtance has been derived from the work of M. Ampere on the Claſſification of the Sciences, from Dr. Whewell's Works, Weiſe's Architectonik, and other ſources, but eſpecially from the work firſt named.

THEOLOGICAL SCIENCES.

THEOLOGY.	Biblical	Biblical Criticiſm. Expoſition—Exegeſis.
	Syſtematical	Dogmatic Theology. Paſtoral Theology.
	Hiſtorical	Church Hiſtory. Hiſtory of Doctrines.

MENTAL SCIENCES.

MENTAL SCIENCES.	Reaſon	Logic, or the Science of the forms of Thought. Metaphyſic, which examines the ground of all knowledge of things.
	Choice and Affection	Morality, founded on the Conception of Right. Æſthetic, founded on the Conception of Beauty.

COSMICAL SCIENCES.

MATHEMATICAL SCIENCES.	Pure Mathematics	Arithmetic. Geometry.
	Phyſico-Mathematics	Mechanics. Aſtronomy.
PHYSICAL SCIENCES.	Phyſics proper	General Phyſics. Technology, or Phyſics applied to Arts and Manufactures.
	Geology	Deſcriptive Geology. Mining, or "Oryctotechny." (Ampere.)

Natural Sciences.	Phytological	Botany. Agriculture.
	Zoological	Zoology proper. Zootechny, knowledge of the uſe of animals to man.
Medical Sciences.	Phyſico-Medical	Medical Phyſics. Hygiene.
	Medical Science proper	Pathology. Practical Medicine.
Political Sciences.	Legiſlation	Political Economy. Hiſtory of Laws and Conſtitutions.
	Government	Adminiſtration of Law. Police and Defence.
Palætiological Science[*]	of the Earth	Hiſtorical Geology. Diſtribution of Plants and Animals.
	of the Human Race.	Gloſſology, or ſcience of affinity of languages. Ethnography, or ſcience of affinity of races.

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[*] i. e. Sciences in which the object is to aſcend from the preſent ſtate of things to a more ancient condition, from which the preſent is derived by intelligible cauſes.

§ 99. *Concluſion.*

Theſe hints may be ſufficient to guide a ſtudent in applying the principles of Pure Logic to the practice of analyſis. If this little work is haſtily examined and caſt aſide, the reader will not have become a logician; he will have learned the unimportant fact that upon this or that diſputed doctrine the author held this or that opinion, and his knowledge will go no further. Inſtead of learning Logic, he will know an inſignificant fact in logical hiſtory. The miſtake is not uncommon;—we enquire what Ariſtotle and Biſhop Butler ſaid on morality, and think that we have ſtudied Moral Philoſophy; we read the Organon, and call ourſelves logicians. Hiſtory preſides over theſe and other facts; we are in *her* domain when we uſe our books in this narrow ſpirit. Philoſophy does not exiſt until the mind of the ſtudent begins to work for itſelf with the principles it receives hiſtorically; to decompoſe and to compoſe anew, to criticize the arguments employed, to eſſay at leaſt to puſh the confines of truth farther into the wilds of error and ignorance, and to leave her a wider territory.

Let thoſe who wiſh to poſſeſs the intellect they have received from above, in the depth and clearneſs, the ſober compoſure, the calm activity which a high degree of culture can alone beſtow, venture to ſtudy Logic in a larger ſpirit than the merely hiſtorical. Let them become dialecticians; not in the ſenſe which the ſophiſt attached to that name, but rather in that which the ſcourge of ſophiſts gave it. Let them not uſe ſo excellent a weapon as the reaſon in mere play, with a guarded point and bated edge, but let them keep it ſheathed, ſharpened and ſhining, till a battle has to be fought againſt an error. Let them watch for themſelves the proceſſes gone through in completing any ſcience. If the rules given in books are erroneous, let them try to correct, if imperfect, to complete them: or, if experience verifies their truth and utility, let them be regarded with a degree of truſt greater than could have been awarded to them before, when they ſtood in books, the mere hiſtorical record of other men's philoſophy. No one who has ſtudied Logic in this conſcientious ſpirit has ever found it trifling or uſeleſs.

THE END.

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